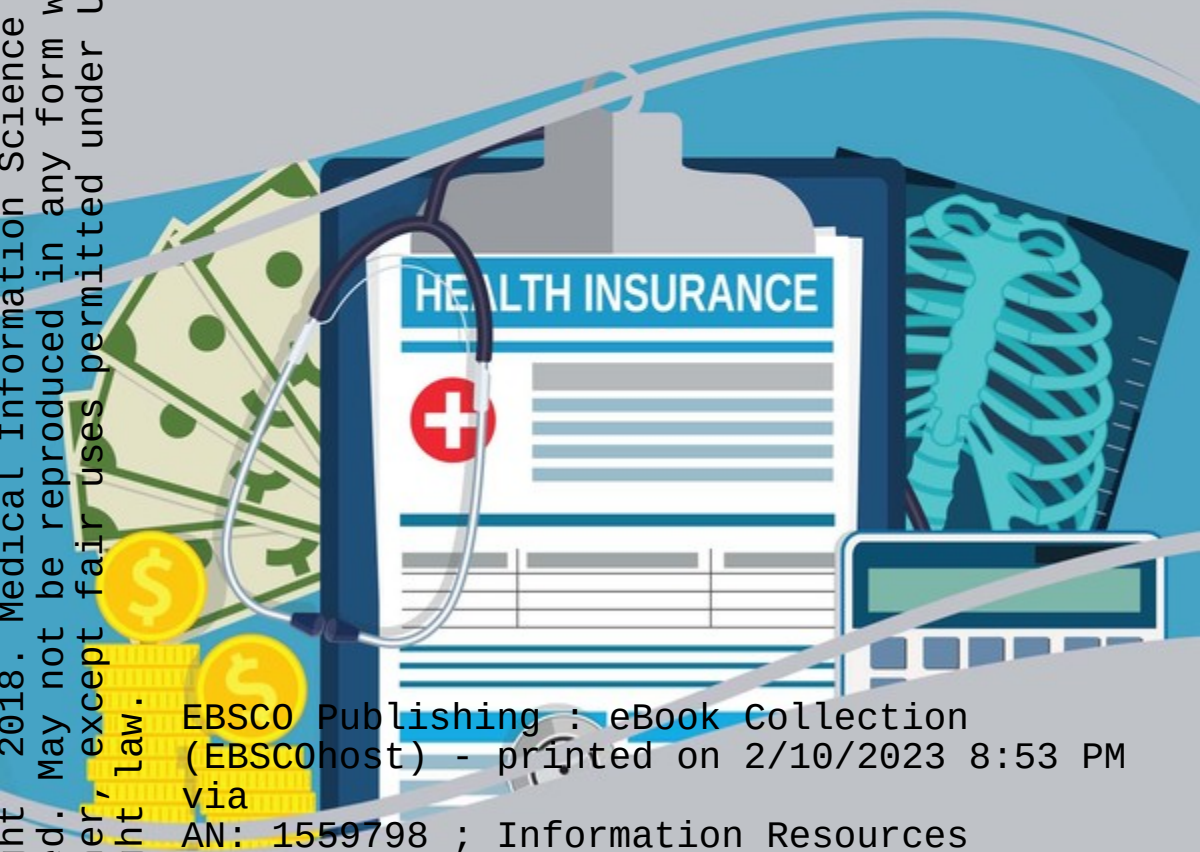
Critical Explorations

Health Economics and Healthcare Reform

Breakthroughs in Research and Practice



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Preface

The constantly changing landscape surrounding health economics and healthcare reform makes it challenging for experts and practitioners to stay informed of the field's most up-to-date research. That is why IGI Global is pleased to offer this single-volume comprehensive reference collection that will empower students, researchers, and academicians with a strong understanding of these critical issues by providing both broad and detailed perspectives on cutting-edge theories and developments. This compilation is designed to act as a single reference source on conceptual, methodological, and technical aspects, as well as to provide insight into emerging trends and future opportunities within the discipline.

Health Economics and Healthcare Reform: Breakthroughs in Research and Practice is organized into four sections that provide comprehensive coverage of important topics. The sections are:

1. E-Health
2. Finance
3. Healthcare Administration
4. Medical Practice

The following paragraphs provide a summary of what to expect from this invaluable reference source:

Section 1, "E-Health," opens this extensive reference source by highlighting the latest trends in electronic health research and applications. Through perspectives on telemedicine, mobile technology, and electronic health records, this section demonstrates the importance of innovative technologies in medical settings. The presented research facilitates a better understanding of how technological applications are optimizing the healthcare industry.

Section 2, "Finance," includes chapters on the pivotal role of sustainable financial infrastructure in healthcare systems. Including discussions on wealth creation, healthcare expenditure, and cost management, this section presents research on the impact of effective economic strategies. This inclusive information assists in advancing current practices structuring and facilitating proper economic systems in healthcare.

Section 3, "Healthcare Administration," presents coverage on novel strategies and policies for healthcare administrative purposes. Through innovative discussions on healthcare reform, nonprofits, and human resource management, this section highlights the importance of leadership and administration in medical systems. These inclusive perspectives contribute to the available knowledge on optimizing the healthcare industry.

Section 4, "Medical Practice," discusses coverage and research perspectives on utilizing the latest trends for effective medical practice and patient care. Through analyses on patient engagement, disease management, and malpractice, this section contains pivotal information on the importance of delivering proper treatment and care to hospital patients.

Although the primary organization of the contents in this work is based on its four sections, offering a progression of coverage of the important concepts, methodologies, technologies, applications, social issues, and emerging trends, the reader can also identify specific contents by utilizing the extensive indexing system listed at the end.

As a comprehensive collection of research on the latest findings related to *Health Economics and Healthcare Reform: Breakthroughs in Research and Practice,* this publication provides researchers, practitioners, and all audiences with a complete understanding of the development of applications and concepts surrounding these critical issues.

Section 1
E-Health

Chapter 1
Telemedicine and Electronic Health:
Issues and Implications in Developing Countries

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ABSTRACT

This chapter reveals the overview of telemedicine; telemedicine in developing countries; Electronic Health Record (EHR); and mobile health technologies. Telemedicine and Electronic Health (e-health) are modern technologies toward improving quality of care and increasing patient safety in developing countries. Telemedicine and e-health are the utilization of medical information exchanged from one site to another site via electronic communications. Telemedicine and e-health help health care organizations share data contained in the largely proprietary EHR systems in developing countries. Telemedicine and e-health help reduce the cost of health care and increases the efficiency through better management of chronic diseases, shared health professional staffing, reduced travel times, and shorter hospital stays. The chapter argues that utilizing telemedicine and e-health has the potential to enhance health care performance and reach strategic goals in developing countries.

INTRODUCTION

Patient safety is a major component of quality in health care (Kasemsap, 2017a). Improving the safety of patient care requires system-wide action and modern technology to identify potential risks to patient safety and implement long-term health care solutions. Telemedicine can increase patient safety and improve health care outcomes (Kasemsap, 2017a). Electronic Health (e-health) is an important area where governments and health care organizations continue to spend money with the hope of improved outcomes and reduced costs (Lerouge, Tulu, & Wood, 2016). An example of e-health implementation is users' exchange of health information through Web 2.0-based social networking sites (SNSs) engender-

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ing modern social health experience that contrasts with the traditional individual experiences of health care services (Lefebvre & Bornkessel, 2013).

Telemedicine and e-health as the application of information and communication technologies (ICTs) in the health sector can offer opportunities in global health care (Parentela, Mancini, Naccarella, Feng, & Rinaldi, 2013), such as the remote visits with patients, immediate access to health care professionals, real-time access to health data, and health monitoring capabilities (Kasemsap, 2017a). As technological advances make inroads into the developing world, telemedicine and health care related information technology (IT) are expected to significantly grow in many developing countries (Alajmi et al., 2016). In many African countries, telemedicine can provide access to scarce specialist care, improve the quality of health care in rural areas and reduce the need for rural patients to travel to seek medical attention (Mars, 2013). Further, in most developing countries, there is a severe scarcity of medical specialists (Iyer, 2009) and telemedicine can solve this problem by managing the new and affordable technology with the potential to deliver the convenient and effective care to patients (Kasemsap, 2017a).

Other examples include the electronic health record (EHR) and health information exchange (HIE) networks (Ben-Assuli, 2015). For many years, the introduction of EHR in medical practice has been considered as the best way to provide efficient document sharing among different organizational settings (Piras & Zanutto, 2010). EHRs and their ability to electronically exchange health information can help health care providers effectively provide higher quality and safer care for patients while creating tangible enhancements in global health care (Kasemsap, 2017b). Mobile health is an example of HIE network application, utilizing mobile technologies (Karia, 2016). Mobile health platforms offer a promising solution to many important problems facing current health care system (Harvey & Harvey, 2014). The advantages of HIE have driven policymakers and politicians to allocate funds for HIE adoption (Williams, Mostashari, Mertz, Hogin, & Atwal, 2012).

This chapter focuses on the literature review through a thorough literature consolidation of telemedicine and e-health. The extensive literatures of telemedicine and e-health provide a contribution to practitioners and researchers by revealing the issues and implications of telemedicine and e-health in order to maximize the impact of telemedicine and e-health in developing countries.

BACKGROUND

Telemedicine is one of the modern health care technologies that have brought an opportunity for people who are living in rural areas to gain better accessibility and quality of health care services (Alajmi et al., 2016). Telemedicine implies that there is an exchange of information, without personal contact, between two physicians or between a physician and a patient (Crisóstomo-Acevedo & Medina-Garrido, 2010). Physicians are very concerned about achieving improved health of patients and communities, and the implementation of telemedicine is seen as an essential tool (Nakayasu & Sato, 2012). One of the largest constraints in developing countries' public health sector is the acute shortage of financial resources that leads to a shortage of medical expertise (Treurnicht & van Dyk, 2012). In addition, lack of health care facilities and effective health care systems are also important problems faced by these countries (Iyer, 2009).

Over the past decade, the interest in e-health has risen very quickly (Jordanova, 2010). E-health encompasses all applications of ICT in health care (Aas, 2011) and covers telehealth that relates to a broader set of activities including patient and health care provider solutions. Telemedicine and e-health

applications have the potential to improve the health care organizations' ability to provide advanced services in a cost-effective manner (Mackert, Whitten, & Krol, 2009). E-health promises effective access to health information, diagnosis, treatment, and care to patients who interact with the system in new ways (Rodrigues, de la Torre Díez, & Sainz de Abajo, 2012).

A growing capacity of IT in the collection, storage, and transmission of information in unprecedented amounts has produced significant problems about the availability of broad limit of the consumers of EHR (Farzandipour, Sadoughi, Ahmadi, & Karimi, 2010). EHR can be used to increase efficiency, support care coordination, and provide caregivers the suitable access to information at any place and any time (Goldwater & Harris, 2011). EHR systems can improve service efficiency and quality within the health care sector and have been widely considered for adoption in health care settings (Li & Slee, 2014). While the push toward the integration of the health care information infrastructure is defined as an important step toward addressing problem of the rising costs of health care, the integration of EHR remains a challenge (Noteboom & Qureshi, 2014).

FACETS OF TELEMEDICINE AND ELECTRONIC HEALTH

This section provides an overview of telemedicine; telemedicine in developing countries; EHR; and mobile health technologies.

Overview of Telemedicine

While demands for health care services may not be easily reduced, it is essential to increase the availability of health services by utilizing new medical technology (Leung, 2013). One plausible solution is the utilization of telemedicine. It can improve both the delivery of health care services and certain aspects of health care centers' administration (Medina-Garrido & Crisóstomo-Acevedo, 2009). Telemedicine is the use of modern telecommunications and IT for the provision of clinical care to individuals at a distance and the transmission of information to provide that care (Übeyli, 2010). However, the digitization of health records, data transmission over public networks, and an assortment of client-side devices increases the opportunity for privacy invasion and identity theft (Pendergrass, Heart, Ranganathan, & Venkatakrishnan, 2015).

Telemedicine-based medical facilities require the availability of a medical expert and telecommunication facilities (Bajwa, 2010). For health care providers and health care organizations, telemedicine offers general improvement of services and increases the simplification in cooperation between specialized care centers and primary health care centers, particularly in emergencies and in acute cases (Gullà & Cancellotti, 2013). Health care organizations implementing telemedicine should plan for organizational changes toward improving patient safety and increasing the quality of care (Aas, 2013). The rationale for telemedicine is recognized in terms of potential effects on improving access to care and redressing inequities in both quality and cost containment regarding greater efficiency and risk avoidance (Bashshur & Shannon, 2012).

The real-time consultation and interface among clinicians across wide distances are becoming more commonplace as the health care technologies of transmission and communications continue to improve (Turchetti & Geisler, 2010). A typical walk-in telemedicine visit involves patient interaction with a trained health care provider who connects the patient to an available physician through videoconferenc-

ing and operates the instruments to perform the patient examination (Serrano & Karahanna, 2011). The videoconferencing technology transmits both images and sounds taken from the patient examination to the physician and permits the real-time interaction, via video and audio, between the physician and patient (Serrano & Karahanna, 2009).

Telemedicine in Developing Countries

Telemedicine is being used to bring health care to the rural and remote areas in developing and underdeveloped countries (Mostafa, Hasan, Kabir, & Rahman, 2013). Rural communities in both developed and developing countries have less health care facilities and a lack of health care workforce, particularly health care professionals (Edirippulige & Smith, 2011) and are characterized by high rates of poverty, mortality, and limited access to the primary health care services (Smith & Edirippulige, 2010).

Implementation of telemedicine in many African countries includes the use of mobile phones and short message service (SMS) to improve patient compliance with drug regimens for HIV/AIDS through text message reminders (Lester et al., 2010) and monitor medication compliance in tuberculosis using a smart pill box (Broomhead & Mars, 2012). eClinical services using mobile phones have been used to promote HIV testing in Uganda (Chib, Wilkin, Ling, Hoefman, & van Biejma, 2012) and South Africa (de Tolly, Skinner, Nembaware, & Benjamin, 2012) and provide HIV information in Uganda (Lemay, Sullivan, Jumbe, & Perry, 2012).

Text message reminders sent to patients have improved appointment adherence in Malawi (Mahmud, Rodriguez, & Nesbit, 2010), and follow-up care in Nigeria (Odigie et al., 2012) and Cameroon (Davey et al., 2012). The iPath, the Web 2.0-based store-and-forward telepathology system, has been widely used in African countries (Sohani & Sohani, 2012). Text messaging for treatment adherence with or without the utilization of smart pill boxes has been utilized in Mozambique (Chindo, 2013), Malawi (Mahmud et al., 2010), Uganda (Siedner et al., 2012), and South Africa (Broomhead & Mars, 2012). eClinical services using mobile phones include cervical cancer screening (Quinley et al., 2011), teledermatology in Egypt (Tran et al., 2011), Botswana (Azfar et al., 2011), and Uganda (Fruhauf et al., 2013), assessing trachoma in Nigeria (Bhosai et al., 2012), obstetrics in Ghana (Andreatta, Debpuur, Danquah, & Perosky, 2011), and telemedicine in Cameroon (Scott, Ndumbe, & Wootton, 2005) and Malawi (Mahmud et al., 2010).

In Cameroon, tele-diabetic retinopathy screening service has been implemented (Jivraj et al., 2011) and the potential utilization of mobile phones to transmit images of trachoma has been used (Bhosai et al., 2012). In Djiboutie, where there are no pediatric orthopedic surgeons, the store-and-forward electronic mail-based service has assisted in diagnosis and has altered case management (Bertani et al., 2012). Mali in West Africa has had a teleradiology service since 2005, with the scanned images sent by satellite from the district hospitals to the capital. Over the first five years, 2500 cases were sent from three participating sites which equate to three cases per site, per week (Bagayoko, Anne, Fieschi, & Geissbuhler, 2011).

Because of the size of its territory and the number of its population coupled with the uneven development of the economy across China, the distribution of the facility of modern medicine mainly resides in the major cities, such as Beijing and Shanghai (Gao, Loomes, & Comley, 2012). In order to reach the remote areas, China begun the development telemedicine techniques in the late 1980s (Gao et al., 2012). Pakistan started its telemedicine project Elixir in 1998 and has established a National Telemedicine Forum in 2001 (Mostafa et al., 2013). In Egypt, a store-and-forward telepathology service linking a hospital in Cairo to hospitals in Italy, England, and the United States has advanced to the virtual microscopy (Ayad & Yagi, 2012).

Electronic Health Record

Correct identification of patients and physicians, the protection of privacy and confidentiality, the assignment of access permissions for health care providers, and the resolutions of conflicts increasingly rise as the main points of concern in the development of interconnected HIE networks (Zuniga, Win, & Susilo, 2010). EHR is used as a platform for population management and patient outreach via the creation of electronic disease registries (Sequist, 2011). Whereas EHR and decision support systems have primarily focused on improved effectiveness and patient safety, HIE has the potential to improve the efficiency of care (Burstin, 2008).

EHR influences the decisions made by physicians (Franczak et al., 2014). One of the quickest and most efficient ways that health care systems can begin to benefit from e-health is through the implementation of electronic patient records (Mathar, 2011) because e-health makes heath care information accessible, actionable, and portable (Kasemsap, 2017c). This dynamic resource provides the health care stakeholders (e.g., patients, payers, and providers) with a comprehensive view of the current and historical patient data compiled from various sources (DePhillips, 2007).

EHR contains retrospective, current and in some cases prospective information regarding the patient's medical condition (Häyarinen, Saranto, & Nykänen, 2008). Baron (2007) stated that the improvement in care quality via EHR application is achievable and needs to be accompanied by certain changes and reforms at the system's organizational level. Providing access to medical information between different providers enables the health care professionals from different organizations to execute as a unit and helps to prevent the double testing which can cut costs (Kapoor & Kleinbart, 2012). Silow-Carroll et al. (2012) found that EHR implementation increases the efficiency of care in hospitals by reducing redundant admissions, shortening the length of stay, and reducing early readmission.

Roukema et al. (2006) stated that each health care institution effectively stores its own records, which contain information on their patients' interactions with that specific practice. This perspective may impede the continuity and quality of care, since no sharing of medical information between providers (apart from details reported by the patients themselves) can occur (Ben-Assuli, 2015). Connecting health providers has been found to be cost-saving (Miller & Tucker, 2014). The issue of flexibility is an important concern when it comes to EHR implementation in small practices where the transformation of office operations leads to a main disruption in the practice's workflow (Goldberg, Kuzel, Feng, DeShazo, & Love, 2012).

Boonstra and Broekhuis (2010) reviewed the literature concerning the acceptance of EHR by physicians, and defined the eight main types of obstacles: financial barriers (whether the physician can afford and profit from such implementation, which is less relevant in the public health system), technical barriers (mostly lack of computer skills among physicians and staff members), time-related barriers (time needed to learn the system, enter data and convert existing records), psychological barriers (especially loss of professional autonomy), social barriers (the collective decision of physicians in the practice to adopt or reject the system), organizational barriers, and the barriers related to the change process (attitudes toward change may lead to the resistance to the new tools).

The benefits of EHR implementation in terms of improved efficiency are likely to outweigh the costs of adoption compared to hospitals that are more efficient (Zhivan & Diana, 2012). The successful implementation and the meaningful use of an EHR are more likely when the system is easily operated, when it is made to fit the clinical workflow and productivity, when initial training is provided, when clinicians are involved in defining their department-specific needs, when the design is suitable, where a realistic timetable is made, and where effective knowledge governance practices are implemented (Goldberg

et al., 2012). Haas et al. (2011) explained that the fundamental goals of privacy (e.g., confidentiality, integrity, and availability) in an EHR must be preserved by entrusting the information to a third party designed to store the various pieces of information in the isolated systems.

Electronic personal health records have the potential to make health information more accessible to patients and to manage as a decision-support system for patients, which manage chronic conditions (Price, Pak, Müller, & Stronge, 2013). Dinevski et al. (2010) indicated that the utilization of electronic patient records allows physicians to see much more of a patient's medical history than do paper files. Kaelber et al. (2008) stated that personal health records represent the most recent platform and allow patients to manage their health information and to communicate with their health care providers. Greenhalgh et al. (2009) indicated that the promising e-health is developed and implemented with personal health records.

Mobile Health Technologies

Mobile communication devices, in conjunction with the Internet and social media, present opportunities to enhance disease prevention by extending health interventions beyond the reach of traditional care (Cole-Lewis & Kershaw, 2010). Mobile technology has been piloted in a range of health-related areas, and has been used to improve the dissemination of public health information (e.g., messages about disease outbreaks and prevention) (Alnanih, Radhakrishnan, & Ormandjieva, 2012).

Mobile health brings economic savings, improves the quality of care, and enhances the patient's quality of life (Jasemian, 2011). Mobile computing provides an alternative method to access medical information (Bardram, 2004) and supports interpersonal communication (Bardram & Hansen, 2004). Mobile phone has proven to be an effective device for facilitating smoother communication and allowing speedier emergency response (Chib, 2010). The widespread adoption of mobile phones and the rapid rise of smartphone ownership have created new opportunities to deploy mobile health tools to empower patients with both knowledge and skills toward improving self-management accessible to patients (Sarasohn-Kahn, 2010).

As mobile phones perform more complex interactions between mobile devices to resident software and other server-based software, they have been recognized as effective tools for telemedicine (Matin & Rahman, 2012). The current use of mobile health technologies includes mobile phone text messaging in order to warn the patient for an upcoming consultation and to support the management of diabetes, hypertension, and smoking cessation (Blaya, Fraser, & Holt, 2010). The ability to keep a wireless connection delivers the potential for the interactive communication from any location; the mobile health devices have the enough computing power to support the multimedia software applications (Phillips, Felix, Galli, Patel, & Edwards, 2010).

Computer systems for health care present a number of usability challenges (Ash, Berg, & Coiera, 2004). Consumer health technologies have the potential for mitigating the critical barriers to quality care (Bauer, Thielke, Katon, Unützer, & Areán, 2014). Web-based and mobile technologies have been designed in research settings among individuals with serious mental illness and their use has not been hampered by cognitive impairments or health literacy (Druss, Ji, Glick, & von Esenwein, 2014). Thielke et al. (2012) indicated that any technology for health improvement must meet the user's specific needs and the patients with chronic diseases may have other personal needs which preclude attention to health improvement.

FUTURE RESEARCH DIRECTIONS

Telemedicine and e-health are the practical delivery of remote clinical services using innovative technology. E-health includes EHR, mobile health technologies, and related information systems. An empirical study on user acceptance of telemedicine and e-health should be further studied. Health informatics is the design, development, and execution of IT resources, specifically for medical health business processes, and is the alignment of IT and health sciences to establish comprehensive health information systems providing specialized IT services for the health care industry. Health informatics is designed to aid medical practitioners in using IT systems and implementing controls to manage medical data. A clinical decision support system (CDSS) is an application that analyzes data to help health care providers make clinical decisions. CDSS works within physicians' EHR workflows and measures patient health and diseases through its specialty-specific metrics. An examination of linkages among telemedicine, e-health, health informatics, and CDSS in developing countries would seem to be viable for future research efforts.

CONCLUSION

This chapter highlighted the overview of telemedicine; telemedicine in developing countries; EHR; and mobile health technologies. Telemedicine and e-health are modern technologies toward improving quality of care and increasing patient safety in developing countries. Telemedicine and e-health are the utilization of medical information exchanged from one site to another site via electronic communications. Telemedicine and e-health help reduce the cost of health care and increases the efficiency through better management of chronic diseases, shared health professional staffing, reduced travel times, and shorter hospital stays. Telemedicine and e-health make it possible for health care providers to better manage patient care through the secure use and sharing of health information. Telemedicine and e-health help health care organizations share data contained in the largely proprietary EHR systems in developing countries. Utilizing telemedicine and e-health has the potential to enhance health care performance and reach strategic goals in developing countries.

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KEY TERMS AND DEFINITIONS

Developing Countries: The countries having a standard of living or level of industrial production well below that possible with financial or technical support.

Electronic Health: The use of information technology in health care.

Health Care: The activity or business of providing the medical services.

Information Technology: A set of tools, processes, and associated equipment employed to collect, process, and present the information.

Internet: The large system of connected computers around the world.

Patient: A person who is receiving medical care.

Physician: A medical doctor, especially one who has general health care skill.

Technology: The utilization of scientific knowledge to solve the practical problems, especially in industry and commerce.

Telemedicine: The provision of diagnosis and health care from a distance using media, such as interactive computer programs and information technology.

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Chapter 2
Mobile Health Technology Evaluation:
Innovativeness and Efficacy vs. Cost Effectiveness

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ABSTRACT

Globally, the advancement of mobile technology and the growing number of mobile phone users has promoted the boom in mobile health services. The influence of mobile technology has, in fact, made healthcare delivery more accessible, affordable and effective today. Consumers are thus increasingly using mobile devices as health service delivery aids across various countries. However, questions remain as to how consumer traits like personal innovativeness and self-efficacy, financial costs related to the service delivery and demographics like age and gender may affect the usage and adoption of mobile health services, especially for emerging economies like Bangladesh. Conceptual model of the study identifies self-efficacy, facilitating conditions, effort expectancy and performance expectancy to be significant constructs that influences users' overall perceptions of mobile health services, along with moderating effects of both age and gender upon the selected factors. Finally, the study highlights managerial implications, future research directions and limitations.

INTRODUCTION

The use of emerging information and communication technology (ICT) has gained an increasing amount of attention due to its ability to improve the delivery of services in various sectors. Particularly, the introduction of ICT in healthcare has made healthcare delivery more accessible and affordable in recent times (Nisha et al., 2015). In fact, electronic health (e-Health) is the new paradigm for healthcare systems

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today, covering both processing and telecommunication technologies. Many healthcare organizations claim e-Health to be a strategic tool for providing quality healthcare that will eventually overcome healthcare related challenges around the world. For instance, e-Health can enable the practitioners to offer services beyond their physical reach. It can also make medical information available to healthcare consumers and therefore make consumers active participants in the healthcare delivery process (Ami-Narh and Williams, 2012).

Globally, a branch of e-Health services - mobile health has been constantly expanding over the last decade. Mobile health (m-Health), as defined by the World Health Organization (WHO), is an area of electronic health that provides health services and information via mobile technologies such as mobile phones and PDAs (Kallander et al., 2013). The introduction of m-Health has initiated a drastic shift in focus from traditional healthcare informatics based on provider driven concepts to consumer health informatics based on the exchange of information and interconnection of mobile computing infrastructure (Rai et al., 2013). In practice, m-Health services are often used for transmitting electronic medical records between medical staff and patients, monitoring patients remotely, sending electronic alerts for disease control and providing useful applications, information, and functionality to healthcare consumers (Lester et al., 2011).

Evidence suggests that the use of mobile technology improves diagnosis and compliance with treatment guidelines and patient information and increases administrative efficiency (Rashidee, 2013). Moreover, there are a number of patients who possess less knowledge and understanding of personal health problems but cannot afford time or money to visit doctors or medical centres on a regular basis. Hence, m-Health not just improves health status rather it effectively addresses healthcare challenges such as access, quality, affordability, behavioral norms, skill development in communication, supply management, information management and financial transactions through the exchange of information (Sultana, 2014).

Although the potential of m-Health services are enormous and research is expanding in this area, little is known about how this mobile-based healthcare service channel is viewed by consumers. Since healthcare services are traditionally hands-on provider-patient direct services channel, it is crucial to understand how consumers' personal traits and the financial cost of consuming such services might influence m-Health adoption and usage intentions of consumers. In emerging countries, technology may be well-perceived but when the content is sensitive like healthcare provisions, acceptance of the technology often depends upon the personal characteristics of consumer behavior and the cost effectiveness of the service, among other factors. This study is therefore motivated by the substantial research opportunities in this interesting and budding space. Specifically, the aim of this paper is to examine the role of personal innovativeness, self-efficacy and financial cost of the service consumption, along with other factors that can influence the acceptance and use of m-Health services from the perspective of an emerging economy like Bangladesh.

The unified theory of acceptance and use of technology (UTAUT) model has been used to pursue the purpose of this paper. Besides original constructs, proposed constructs of personal innovativeness, perceived self-efficacy and perceived financial cost has been included to examine the factors that can influence users' intention to use m-Health services in Bangladesh. Additionally, the moderating impact of consumers' age and gender has been explored in this paper. This study thus has both theoretical and managerial implications. Theoretically, drawing upon relevant literature, this paper aims to provide a model that is capable of understanding the determinants behind the future adoption of m-Health services among the people of Bangladesh. From a managerial perspective, the findings of this research should

provide further insights into understanding and managing potential m-Health users from emerging economies by focusing on consumer behavior and cost effectiveness of the service. This study can also assist various public and private hospitals and various telecommunication networks to consider the idea of providing m-Health services to the people of Bangladesh.

LITERATURE REVIEW

This study argues that traits of consumer behavior like their personal innovativeness and perceived self-efficacy, together with the perceived financial cost of m-Health services plays a deterministic role in influencing the future use of such services in the context of Bangladesh. As such, the current practice of m-Health services and its implications in Bangladesh, followed by the research platform and proposed constructs of the study has been discussed to determine the gaps for the study.

Scope of Mobile Health Initiatives

The general category of m-Health innovations provided in developed countries are typically used by consumers for activities related to obtaining health advice, promoting compliance and adherence to medical treatments, staying connected with healthcare providers, personal health management, etc (Madon et al., 2014). However, in emerging economies like Bangladesh, the scope of m-Health services had been initially limited to only patient monitoring, sending text messages in order to remind patients to take needed medications and to offer suggestions for maintaining health while pregnant.

Over time, the government of Bangladesh developed a Health Management Information System (MIS) department under the Directorate General of Health Services (DGHS) and initiated a number of m-Health programmes. The various m-Health initiatives are currently operational through nationwide mobile phone network, wherein health professionals provide basic health advices and initial diagnosis to the service recipients (DGHS, 2014). It mostly involves the services of government-run health complexes and district hospitals using mobile phones as a local 24-hour call centre. People residing in the rural areas can contact with the health professionals through this network. They can make calls, free of charge, and the doctor on duty will provide free medical advice (Nisha et al., 2015). Moreover, web-camera has been given in each sub-district, district, medical college and post-graduate institute hospitals in Bangladesh. These hospitals, therefore, can give telemedicine services using video conferencing platforms as well. The government has also established free tele-consultation with government doctors, SMS services for patient management and communication with staff, telemedicine services using instant messaging client or other online platforms, etc. (Nisha et al., 2016).

In addition to these services, the government of Bangladesh initiated an agreement between the International Telecommunication Union (ITU) and World Health Organization (WHO) in order to use mobile technology, in particular text messaging and applications, to help combat non-communicable diseases (NCDs) such as diabetes, cancer, cardiovascular diseases and chronic respiratory diseases in Bangladesh (WHO, 2011). The scope of m-Health initiatives was further increased in the country by the Mobile Alliance for Maternal Action (MAMA) Bangladesh program from D.Net, with assistance from USAID and Johnson & Johnson, as it started providing voice messages on safe pregnancy, health and nutrition related matters for pregnant women, etc. (Reza, 2012). Such considerable exploration of

the ways of providing healthcare services over the mobile platform has made m-Health a great initiative today in the healthcare sector of Bangladesh.

However, m-Health services do not yet have a wide usage rate in the country. The cynical behavior of consumers and the financial cost of attaining such services might be hindering the acceptance and use of such services in the context of Bangladesh. As such, it is imperative to examine the factors of consumer behavior and the cost effectiveness of m-Health programmes that can influence the adoption and usage of m-Health services among the people of Bangladesh.

Research Platform of the Study

One of the most important branches of information system research is to understand individual acceptance and use of information technology according to many literatures. The focus shifted towards technology acceptance and use, when the Technology Acceptance Model (TAM) was widely employed in many past studies (Davis, 1989; Davis et al., 1989). Based on TAM synthesis of prior technology acceptance research, Venkatesh et al. (2003) developed the unified theory of acceptance and use of technology (UTAUT) model. The factors included in UTAUT (performance expectancy, effort expectancy, social influence and facilitating conditions) has been primarily used to predict the behavioral intention to use a technology and technology use in organizational contexts, moderated by individual difference variables like age, gender, experience and voluntariness (Venkatesh et al., 2012).

In both organizational and non-organizational settings, UTAUT has repeatedly served as a baseline model to study a variety of technologies. However, given the number of technology devices, applications and services that are targeted at consumers in recent times, it became necessary to identify the factors that can influence consumer adoption and use of technologies (Stofega and Llamas, 2009). This led to the introduction of the UTAUT2 model by Venkatesh et al. (2012).

In UTAUT2, Venkatesh et al. (2012) adapted the four key constructs (i.e. performance expectancy, effort expectancy, social influence and facilitating conditions) that influence behavioral intention to use a technology and technology use from the original UTAUT model and customized it to fit the consumer context. Previous studies like Venkatesh et al. (2003) claim that the constructs of performance expectancy, effort expectancy and social influence determines the behavioral intention to use a technology, while behavioral intention and facilitating conditions influence the technology use in a particular context.

In addition, Venkatesh et al. (2012) further claimed that the addition of new constructs in a consumer context can contribute to the expansion of the theoretical horizons of the UTAUT model. Following the suit, this study has selected the original UTAUT and UTAUT2 model as a theoretical foundation to develop a proposed research model for the domain of healthcare from the consumers' perspective.

For this study, personal traits of consumers in the form of innovativeness and efficacy have been considered to play an important role in influencing the behavior of the urban people. This is because the urban people are still concerned about whether advice from an unknown hospital doctor should be taken into account, despite there being a substantial section of the rural population that uses m-Health applications today in Bangladesh. Moreover, the financial cost of adopting such technology-based services have been included as part of the proposed research model, in order to examine the influence of cost effectiveness on the usage and adoption of m-Health services in emerging economies like Bangladesh.

Proposed Constructs of Innovativeness, Self-Efficacy and Financial Cost

Conceptualized as a personal trait, innovativeness represents the degree to which an individual is willing to take a risk by trying out an innovation. West (2012) claimed that consumers with this trait generally showcase a positive behavior towards the adoption of new technology-based services. However, there is a set of innovation attributes that may affect adoption decisions like relative advantage, ease of use, compatibility, observability and trialability (Rogers, 1995). Among these attributes, relative advantage, ease of use and compatibility are the most influencing factors for the adoption of mobile-based technologies like m-Health services (Lin, 2011). Putzer and Park (2012) and Jackson et al. (2013) argued that consumers with more positive beliefs about the relative advantage of m-Health services form a favorable attitude, while those who find m-Health easy to use are more willing to use them for their healthcare needs. Based on several empirical evidences, Venkatesh et al. (2003) proved that relative advantage and ease of use are the major constructs of performance expectancy and effort expectancy respectively in the UTAUT model. As such, personal innovativeness of consumers might have a significantly positive effect on performance expectancy and effort expectancy, which in turn can impact the behavioral intention of consumers towards m-Health services (Barton, 2012).

Another measure of consumer behavior in the context of m-Health services is perceived self-efficacy, which can be defined as the judgment of one's ability to use health services over the mobile platform. Previous studies like Burner et al. (2013), Evans et al. (2014) and Maddison et al. (2014) provided empirical evidence that perceived self-efficacy is a determinant in influencing consumer intention towards m-Health adoption. However, some studies like Holtz and Lauckner (2012) and Free et al. (2013) argued that self-efficacy is not a direct determinant that can affect individual intention to adopt m-Health initiatives. On the other hand, empirical evidence by Sieverdes et al. (2013) supported the existence of a causal relationship between perceived self-efficacy and behavioral intention of consumers towards m-Health services.

An important driving factor towards the adoption of m-Health services is often the financial cost or cost burden that is related to the use of such services. Past studies by Cruz et al. (2010) and Huili and Zhong (2011) provided empirical evidence that economic factors like service fees play an essential role in the adoption of any technology-based services, particularly those related to the mobile platform. Even researchers like Deglise et al. (2012), Tamrat and Kachnowski (2012) and Kumar et al. (2013) argued that the construct of perceived financial cost has a negative impact upon the behavioral intention of consumers to use m-Health services. A recent study by de la Torre-Diez et al. (2015) also claimed that if consumers need to spend considerable money to pay for the m-Health services, they may be unlikely to use the technology, indicating a negative relationship between its cost effectiveness and adoption intention.

RESEARCH MODEL AND HYPOTHESES

The purpose of this study is to determine the factors that can explain and predict users' intention to use m-Health services significantly in the context of Bangladesh. Along with the four key constructs (i.e. performance expectancy, effort expectancy, social influence and facilitating conditions) of the original model, three additional constructs, drawn from previous literature of m-Health services, has also been incorporated in this research model to make a significant theoretical contribution to the consumer context of the UTAUT model. The proposed research model used to address the influencing factors for

healthcare technologies has been presented in Figure 1. In addition, all the variables hypothesized in this study and their likely relationships towards consumer acceptance and use of m-Health services in Bangladesh has been discussed next.

Personal Innovativeness

Innovativeness is the willingness to adopt an innovative technology or the degree of interest in trying a new thing, new concept or an innovative product or service (Rogers, 1995). It has been tested and proved as a significant construct that affects technology usage intention very often by researchers like Agarwal and Prasad (1998), Hung et al. (2003) and Yang (2005). Ami-Narh and Williams (2012) identified a set of innovation attributes that may affect adoption decisions of internet-based technologies like relative advantage, ease of use, complexity, compatibility, observability and trialability. In fact, many empirical evidences also proved that relative advantage and ease of use are the key constructs of performance expectancy and effort expectancy respectively in the UTAUT model (Venkatesh et al., 2003). Since Wu et al. (2011) and Rai et al. (2013) showed positive relationship between personal innovativeness and adoption of m-Health technology, this study hypothesizes that:

H1A: Personal innovativeness positively influences performance expectancy of m-Health services.
H1B: Personal innovativeness positively influences effort expectancy of m-Health services.

Performance Expectancy

Burgess and Sargent (2007) and Wu et al. (2007) argue that the effect of performance expectancy is the most relevant factor for the adoption of internet-based technology. Performance expectancy generally depicts a users' view of the usefulness of adopting a technology (Venkatesh et al., 2003). Sun et al. (2013) claim that in the context of m-Health services, the usefulness can only be captured by the extent to which it can help users to solve their health-related issues. If users believe that using m-Health services can help them to solve their problems, they are more likely to adopt this technology. Hence, the hypothesis is:

H2: Performance expectancy significantly affects individual intention to use m-Health services.

Effort Expectancy

Effort expectancy is considered to be directly related with the ease of using a particular technology (Phichitchaisopa and Naenna, 2013). According to Venkatesh (1999), all of these effort-oriented constructs act as more significant factors during the early stages of adopting a new technology. Several studies like Park et al. (2007), Moores (2012) and Sun et al. (2013) claims that perceived ease of use or effort expectancy has considerable impacts on attitude towards the adoption of m-Health or any other healthcare related technology. As a result, the following hypothesis has been proposed:

H3: Effort expectancy significantly affects individual intention to use m-Health services.

Social Influence

Social influence refers to the degree to which an individual perceives that important others believe he or she should use the new system or technology (Venkatesh et al., 2003). The idea behind social influence is that even though an individual may not be in favour of adopting a new technology, they intend to use it as he/she believes it will enhance his/her image among his/her family and peers (Venkatesh and Davis, 2000). Researchers like Jung (2008) and Sun et al. (2013) empirically showed that there is a significant positive relationship between social influence and adoption of m-Health technology. Thus, the proposed hypothesis is:

H4: Social influence significantly affects individual intention to use m-Health services.

Facilitating Conditions

According to Venkatesh et al. (2003), facilitating conditions refer to the resources and technical infrastructure that a user believes exists to support the adoption of a particular technology. In other words, facilitating conditions indicates the prospective conditions that may restrain or facilitate adopting a technology (Sun et al., 2013). Venkatesh et al. (2012) claims that a consumer with a lower level of facilitating conditions can have a lower intention to use a particular technology. Moreover, Boontarig et al. (2012), Phichitchaisopa and Naenna (2013) and Sun et al. (2013) showed that there is a positive significant relationship between facilitating conditions and healthcare technologies. Based on these findings, this study hypothesizes that:

H5: Facilitating conditions significantly affects individual intention to use m-Health services.

Perceived Self-Efficacy

Self-efficacy refers to the users' judgment of their ability to perform a particular behaviour (Compeau and Higgins, 1995). The concept of self-efficacy is identical to perceived behavioral control and according to Sun et al. (2013), perceived behavioral control in the context of m-Health services can be defined as the users' ability to learn and use mobile health services. If a user is confident enough regarding his ability to adopt a technology like m-Health, he/she is more likely to adopt that technology. In fact, Wu et al. (2007) and Sun et al. (2013) empirically proved that self-efficacy is a determinant of the intention and usage behavior of m-Health services. Accordingly, the following hypothesis has been conceived:

H6: Perceived self-efficacy significantly affects individual intention to use m-Health services.

Perceived Financial Cost

Even though researchers generally investigate user adoption of a technology from psychological and sociological theories, it has been proved by several empirical evidences that technology acceptance is influenced by economic factors as well (Luarn and Lin, 2005; Yang 2009; Yu, 2012). Financial cost is thus a very crucial predictor of the acceptance behavior of technological services as it refers to the cost or resources (money) associated with the learning and using of that technology. For instance, if a user needs

to spend considerable amount of money to pay for the services to learn or to use the technology, he/she will be unwilling to use it, demonstrating a negative relationship between financial cost and behavioral intention. Sun et al. (2013) supported this finding by showing empirical evidence of the influence of financial cost on the adoption of m-Health services. Hence, the hypothesis is:

H7: Perceived financial cost significantly affects individual intention to use m-Health services.

Behavioral Intention

Behavioural intention, which refers to the intention to use a system, is the major determinant of the actual behaviour. Researchers like Venkatesh and Zhang (2010) and Yu (2012) have repeatedly emphasized the strength of the construct of behavioural intention on usage behaviour. These past studies claim that individual behavior is predictable and can be influenced by individual intention that, in turn, can have a significant influence on technology usage. In the context of m-Health services, Jung (2008) and Sun et al. (2013) investigated and empirically proved that behavioural or adoption intention of the technology positively affects its usage. Following the lead, this study next hypothesizes that:

H8: Behavioral intention significantly affects individual behavior of using m-Health services.

Moderators

Moderators are demographical characteristics or other situational variables that have a profound impact on user adoption (Jung, 2008). They have the capability to shift the dynamics in user acceptance models. Venkatesh et al. (2003) had employed four moderator variables of age, gender, experience and voluntariness in the original UTAUT model. However, this study does not include the moderating variables of experience and voluntariness. Therefore, only age and gender has been used in this study as moderators to investigate the effects of the proposed research structure on the behavioral intention to adopt m-Health services.

Moderator Effects: Age

Past empirical studies like Venkatesh et al. (2003) and Gilbert et al. (2004) claimed that age has a strong moderating impact on technology adoption. According to Gilbert et al. (2004), people over 55 years of age were found to be less likely to adopt technology. Jung (2008) supported this claim by stating that younger generation is more eager to adopt a technology like m-Health services than older generation. Since younger people tend to be more tech-savvy, they can adopt any technology quickly. In addition, due to high perceived accessibility, credibility, personal innovativeness and compatibility all internet-based health technologies go well with the life style of young people, which in turn leads them to accept the technology (Jung, 2008). However, Lee and Rho (2013) argue that middle-aged people display more enthusiasm towards adopting m-Health technology than the younger people. As a result of this conflicting evidence of past studies, it is essential to determine the moderating effect of age in the context of m-Health services. Hence, the following hypotheses are proposed:

H9: Influence of performance expectancy on individual intention will be moderated by age.
H10: Influence of effort expectancy on individual intention will be moderated by age.
H11: Influence of social influence on individual intention will be moderated by age.
H12: Influence of facilitating conditions on individual intention will be moderated by age.
H13: Influence of perceived self-efficacy on individual intention will be moderated by age.
H14: Influence of perceived financial cost on individual intention will be moderated by age.

Moderator Effects: Gender

Gender is also hypothesized as a salient moderator in the context of technology acceptance. A number of prior studies have showed that men tend to adopt a technology more quickly than women. Several researchers like Laukkanen and Pasanen (2008) and Cruz et al. (2010) claimed that women are naturally risk averse and passive users of technology which makes them less willing to spend more effort associated with adopting a new system. On the other hand, these empirical studies have also provided evidence of men being more concerned about the cost related to a particular technology. Venkatesh and Morris (2000) found performance expectancy to be more important construct for men while constructs that relate to technical abilities such as effort expectancy appeared to be more salient for women. Venkatesh et al. (2003) further claimed that social influences act as a stronger predictor of technology adoption for women than men. However, in the context of e-health or m-Health, some researches like Jung (2008) and Lee and Rho (2013) claimed that women are usually more concerned about health-related issues, which in turn makes them to adopt internet-based health technologies. Thus, to determine the moderating effect of gender, this study hypothesizes that:

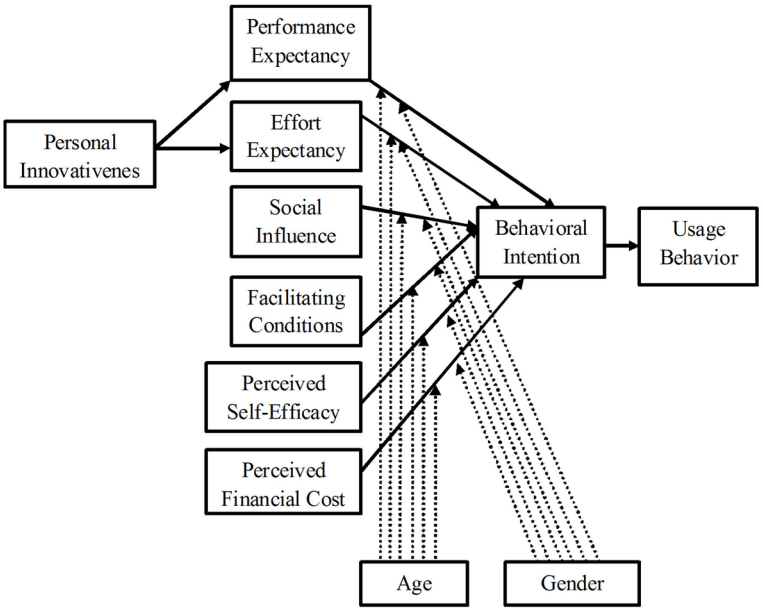
H15: Influence of performance expectancy on individual intention will be moderated by gender.
H16: Influence of effort expectancy on individual intention will be moderated by gender.
H17: Influence of social influence on individual intention will be moderated by gender.
H18: Influence of facilitating conditions on individual intention will be moderated by gender.
H19: Influence of perceived self-efficacy on individual intention will be moderated by gender.
H20: Influence of perceived financial cost on individual intention will be moderated by gender.

Research Method

Data Collection

Data for this study was collected by conducting a survey through paper-based questionnaires on a sample of 1000 respondents in the capital city of Bangladesh – Dhaka. The predominant existence of mobile health services in the rural areas has inadvertently raised the question as to why urban people still avoid the use of such services. In addition, the absence of city hospitals as the provider of m-Health services has made it imperative to examine the acceptance and use of m-Health services among the city dwellers of Bangladesh. As such, the population selected for this study only represented urban people who are currently exposed to the use of mobile phones and can thereby avail mobile health services in the future.

Figure 1. The proposed research structure



By using probability sampling and a stratified random sampling method, respondents were then selected for the sample. The use of this particular sampling method allowed us to avoid biasness in data and provided equal opportunity for all city dwellers who can be the potential users of mobile health services in Bangladesh. Respondents were mostly educated and had English proficiency and so they were asked to self-administer the English version of the questionnaire. In other cases, the participants self-administered the Bengali version of the questionnaire or the research assistants themselves filled in the questionnaire based on the respondents' verbal responses.

Measurement

All the items used to measure the research variables of the survey were adapted from previous studies on information and technological advancements, e-Health services and m-Health services - with minor changes in wording to tailor them to the context of Bangladesh. This ensured the content validity of the questionnaire used to assess each constructs depicted in Figure 1. The quantitative survey contained 30 statements in order to evaluate the original constructs of the UTAUT model and the three new constructs proposed for the model, as listed in Table 1. The scales for the UTAUT constructs (performance expectancy, effort expectancy, social influence, facilitating conditions and behavioral intention) were adapted from Venkatesh and Zhang (2010), Sun et al. (2013), Nisha et al. (2015) and Nisha et al. (2016). The scales for personal innovativeness were drawn from Wu et al. (2011), while the items used to assess perceived self-efficacy and perceived financial cost were solely based on Luarn and Lin (2005), Yu (2012) and Sun et al. (2013). All these items were measured using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree".

Table 1. Constructs and corresponding items

Constructs	Corresponding Items	Items Sources
Personal Innovativeness	(PI1) I am curious about new health technologies (PI2) I am usually among the first to try new health technologies (PI3) I like to experiment with new health technologies (PI4) I like to keep updated with new health technologies	Wu et al. (2011)
Performance Expectancy	(PE1) Using m-Health services will improve my life quality (PE2) Using m-Health services will make my life more convenient (PE3) Using m-Health services will make me more effective in my life (PE4) Overall, I find m-Health services to be useful in my life	Sun et al. (2013), Nisha et al. (2015)
Effort Expectancy	(EE1) Learning to use m-Health services is easy for me (EE2) Becoming skillful at using m-Health services is easy for me (EE3) Interaction with m-Health services is easy for me (EE4) Overall, I think m-Health services are easy to use	Sun et al. (2013), Nisha et al. (2016)
Social Influence	(SI1) People who are important to me think that I should use m-Health services (SI2) People who are familiar with me think that I should use m-Health services (SI3) People who influence me think that I should use m-Health services (SI4) Most people surrounding me use m-Health services	Sun et al. (2013), Nisha et al. (2015)
Facilitating Conditions	(FC1) Using m-Health services suits my living environment (FC2) Using m-Health services fits into my working style (FC3) Using m-Health services is compatible with my life (FC4) Help is available if I have problems in using m-Health services	Venkatesh & Zhang (2010), Nisha et al. (2016)
Perceived Self-Efficacy	(PSE1) It is easy for me to use m-Health services (PSE2) I have the capability to use m-Health services (PSE3) I am able to use m-Health services without much effort	Sun et al. (2013)
Perceived Financial Cost	(PFC1) The cost of using m-Health services is higher than other health channels (PFC2) The internet charges required to use m-Health services are expensive (PFC3) The mobile devices required to use m-Health services are expensive (PFC4) Using m-Health services can be a cost burden to me	Luarn & Lin (2005), Yu (2012)
Behavioral Intention	(BI1) I prefer to use m-Health services (BI2) I intend to use m-Health services (BI3) I plan to use m-Health services	Sun et al. (2013), Nisha et al. (2015)

The questionnaire included two demographic questions of gender and age as well. While age was measured in years, gender was coded as 1 or 2 dummy variable - where 2 represented the female respondents. After a three-week survey, 908 completed and usable responses were obtained from the structured questionnaires. Table 2 represents the demographic information of respondents in terms of gender and age.

DATA ANALYSIS AND RESULTS

The research model was tested using the structural equation modeling (SEM) facilitates of SmartPLS (version 2.0). The method of partial least squares (PLS) was mainly chosen to conduct this analysis since a number of interaction terms have been included in the research model and PLS is capable of testing these effects (Chin et al., 2003). As such, the measurement model was examined first to assess the reliability and validity of the constructs and then, the structural model was analyzed to examine the relationships hypothesized in the research model.

Table 2. Demographic profile of respondents

Demographics	Frequency	Percentage (%)
Gender		
Male	520	57.3
Female	388	42.7
Age		
20 or below	152	16.7
21 – 30	460	50.7
31 – 40	139	15.3
41 – 50	84	9.3
Above 50	73	8.0

Measurement Model

Results from the measurement model are presented in Tables 3 and 4 and it includes information about the reliability, validity, correlations and factor loadings. The composite reliabilities of the constructs ranged between 0.731 and 1.000, which exceeds the 0.7 cut-off value as recommended by Nunnally and Bernstein (1994). The average variance extracted (AVE) was greater than 0.5 in all cases and greater than each square correlations, which indicates that the model has both convergent validity and discriminant validity (Fornell and Larcker, 1981). Moreover, the internal consistency reliabilities (ICRs) of multi-item scales modeled with reflective indicators was 0.75 or greater, suggesting adequate reliability. The pattern of loadings and cross-loadings also supported internal consistency and discriminant validity, with some exceptions: one item from each construct of personal innovativeness, social influence, facilitating conditions and perceived financial cost were deleted due to their low loadings and high cross-loadings.

Structural Model

The path coefficients and significance levels in the structural model are presented in Figure 2. The construct of personal innovativeness displayed an insignificant path towards both performance expectancy (0.069, $p>0.05$) and effort expectancy (0.119, $p>0.05$). Among other factors, perceived self-efficacy (0.247, $p<0.05$), facilitating conditions (0.235, $p<0.05$), effort expectancy (0.169, $p<0.05$) and performance expectancy (0.155, $p<0.05$) showed significant and positive paths to the behavioral intention of using mobile health services, in their order of influencing strength.

However, the constructs of both social influence (-0.024, $p>0.05$) and perceived financial cost (-0.066, $p>0.05$) reported an insignificant path towards the individual behavior of using mobile health services. Therefore, all hypotheses (except H1A, HIB, H4 and H7) dealing with behavioral intention to use mobile health services are supported. Subsequently, the hypothesized relationship between behavioral intention and usage (0.251, $p<0.05$) is found to be statistically significant, thereby supporting hypothesis H8.

Table 3. Factor loadings, composite reliability and AVEs

Constructs	Items	Factor Loadings	Composite Reliability	AVE
Personal Innovativeness	PI1	0.853	0.876	0.702
	PI3	0.825		
	PI4	0.835		
Performance Expectancy	PE1	0.807	0.889	0.668
	PE2	0.847		
	PE3	0.850		
	PE4	0.761		
Effort Expectancy	EE1	0.822	0.895	0.680
	EE2	0.834		
	EE3	0.840		
	EE4	0.802		
Social Influence	SI1	0.867	0.891	0.732
	SI2	0.876		
	SI3	0.823		
Facilitating Conditions	FC1	0.776	0.864	0.680
	FC2	0.877		
	FC3	0.818		
Perceived Self-Efficacy	PSE1	0.790	0.860	0.672
	PSE2	0.835		
	PSE3	0.833		
Perceived Financial Cost	PFC2	0.889	0.842	0.642
	PFC3	0.764		
	PFC4	0.743		
Behavioral Intention	BI1	0.868	0.891	0.731
	BI2	0.873		
	BI3	0.823		

Moderator Effects

The PLS results of the moderating effects of age and gender on the six constructs toward behavioral intention are shown in Table 5. Results indicate that gender significantly moderated the effect of perceived financial cost and effort expectancy to behavioral intention of using mobile health services. Analysis reveals that male respondents perceive more effort expectancy in using mobile health services and are usually more concerned about the perceived financial cost than the female respondents. On the other hand, the moderating effect of age is significantly reported for the constructs of effort expectancy, facilitating conditions and performance expectancy towards behavioral intention. Further analysis reveals that the construct of effort expectancy plays an important role for respondents aged between 41-50 years, while facilitating conditions and performance expectancy are more salient to respondents aged between 31-40 years.

Table 4. Measurement model estimations

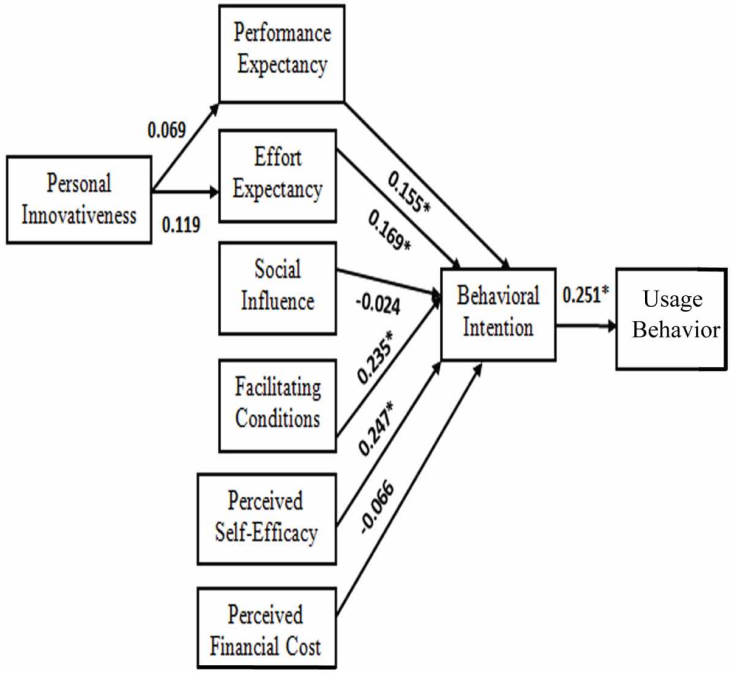
	ICRs	BI	EE	FC	PE	PFC	PI	PSE	SI
BI	0.8	**0.9**							
EE	0.8	0.5	**0.8**						
FC	0.8	0.5	0.4	**0.8**					
PE	0.8	0.4	0.6	0.4	**0.8**				
PFC	0.8	0.0	-0.1	0.0	0.0	**0.8**			
PI	0.8	0.5	0.4	0.3	0.4	0.0	**0.8**		
PSE	0.8	0.4	0.2	0.3	0.3	0.1	0.3	**0.8**	
SI	0.8	0.4	0.4	0.3	0.3	0.1	0.3	0.3	**0.9**

Notes:

1. BI (Behavioral Intention); EE (Effort Expectancy); FC (Facilitating Conditions); PE (Performance Expectancy); PFC (Perceived Financial Cost); PI (Personal Innovativeness); PSE (Perceived Self-Efficacy); SI (Social Influence).

2. Diagonal elements represent the AVEs, while off-diagonal elements represent the square correlations.

Figure 2. Results of structural equation modeling



FINDINGS AND IMPLICATIONS

This study has revealed quite a few understandings on the backstage possibilities of the potential usage of mobile health services among the urban population of Bangladesh. Constructs such as perceived self-efficacy, facilitating conditions, effort expectancy and performance expectancy has been found to have a salient influence on behavioral intention, which directly stimulates the usage of m-Health services. On

Table 5. PLS results with moderators

	Dependent Variable	Usage Behavior
	Behavioral Intention	
R^2	0.409	0.632
R^2 adjusted	0.409	0.632
Performance Expectancy (PE)	**0.155***	
Effort Expectancy (EE)	**0.169***	
Social Influence (SI)	-0.024	
Facilitating Conditions (FC)	**0.235***	
Perceived Self-Efficacy (PSE)	**0.247***	
Perceived Financial Cost (PFC)	-0.066	
Age	**0.017***	
Gender	**0.050***	
PE x Age	**0.048***	
EE x Age	**0.059***	
SI x Age	0.017	
FC x Age	**0.060***	
PSE x Age	0.006	
PFC x Age	0.046	
PE x Gender	0.034	
EE x Gender	**0.051***	
SI x Gender	0.004	
FC x Gender	0.035	
PSE x Gender	0.001	
PFC x Gender	**0.051***	
Behavioral Intention (BI)		**0.251***

*significant at 0.05

the other hand, personal innovativeness, social influence and perceived financial cost are identified as insignificant factors of behavioral intention in the context of Bangladesh. The inclined reasons behind such findings are quite obvious and most of such are shaped by the local culture and infrastructure of the country.

Given that self-efficacy is the most important construct of shaping behavioral intention of m-Health services in this study, this finding is consistent to the empirical evidence provided by Sun et al. (2013), Sieverdes et al. (2013) and Deng et al. (2014). Through this finding, the study exhibits the importance of building a confidence level among the target market. Since m-Health is a new practice, creating an assurance of the simplicity or ease of using such services may enhance its adoption speed. Take away for marketers from this finding will be emphasizing on creating the confidence level through different communication strategies such as showing how technologically challenged people are also using the service effortlessly. Other techniques like free trials, demonstrations, trainings, etc may also boost the adoption of m-Health services in Bangladesh.

Facilitating conditions is found as the next strongest direct determinant in influencing respondents' behavioral intention of m-Health services. This finding is consistent to Boontarig et al. (2012), Phichitchaisopa and Naenna (2013) and Nisha et al. (2015). The penetration of mobile phones is a comparatively new concept in Bangladesh and particularly, when such devices are being used as a platform of commuting other errands such as receiving instant health care advices, ensuring facilitating conditions has a strong role to play (Nisha et al., 2015). Therefore, the first business implication is that, beyond offering ease-of-use and useful m-Health services, providers might emphasize on the compatibility between the offered services and the working/living styles of their target customers. That is, putting efforts in designing suitable services and infrastructures to meet specific needs of different customer segments. In perspective of Bangladesh, facilitating conditions generally tend to be wide availability of computers, strong mobile networks and fast internet services. Both government and private sector hospitals and clinics, along with leading telecom companies of Bangladesh have already set their foot targeting the rural segments and working on developing the infrastructure challenges highlighted above.

The study further drills that most of the current and potential users of m-Health services tend to judge the importance of the service based on the required effort expectancy for it. This finding is consistent with the evidence provided by Braun et al. (2013), Free et al. (2013) and Sun et al. (2013). Respondents who expect less effort input in the service consuming process, especially at the adoption stage like that of m-Health services in Bangladesh, are more likely to show positive attitude in embracing the service. By making sure that the target market perceives the efforts needed to avail these services as an ease, companies can net a positive attitude towards these services (Nisha et al., 2016). Communications of the mobile health service providers should focus more on the actual handiness of such services.

Performance expectancy is the next most important construct according to the research findings of this study. Bowling (2014), Nisha et al. (2015) and Nisha et al. (2016) have also found such similar results in their studies. Sustainable relative advantages of m-Health service such as saving time, receiving immediate and accurate healthcare advices, etc., play an important role in shaping behavior in terms of adopting such new technologies. The underlying cause behind such result is the novelty of such technology in the culture of Bangladesh, where most of the errands are preferred to be served in a traditional manner from physical locations. Take away for marketers from this finding is to ensure a lot of confidence among the users by highlighting the value propositions of such service with their importance in their daily life through the marketing mix of the companies. Using problem-solving and demonstration as their communication execution styles may help the providers to get their market conditioned both in cognitive and in behavioral learning context (Nisha et al., 2015). Developing a sustainable system which ensures privacy and efficiency to support the clinching benefits of m-Health services is additionally important to encourage the consumption of such services in Bangladesh.

Alternatively, the constructs of personal innovativeness, social influence and perceived financial cost has been noted to have an insignificant role to play in terms of shaping behavioral intention for m-Health services in Bangladesh. Since Bangladesh is not yet technologically advanced to a large extent, interest and willingness of using or trying out new technology related services is absent among the consumers – thereby, leading to a low usage rate of m-Health services. Moreover, as health is a prominent and sensitive issue, respondents might not be significantly influenced by peer groups and interpersonal world-of-mouth. It might require a lot of creative publicity, sales promotional activities using support media and positive testimonials to spread the viral of m-Health services among the consumers. On the other hand, cost effectiveness of such services clearly does not influence the usage and adoption of m-Health services in Bangladesh. This is because the call rates in this emerging economy are quite low in com-

parison to any other developed or developing countries. In recent times, the government of Bangladesh has set the current call rate from minimum BDT 0.25 to maximum BDT 2 per minute (bdnews24.com, 2014). Also, since receiving proper healthcare in an emergency is of much importance for any human life that cost might have a very little role to play for the urban and at times, for the rural market as well.

In terms of the moderating consequences of age and gender, this study indicates that age significantly moderates the effect of effort expectancy, facilitating conditions and performance expectancy towards behavioral intention for mobile health services. Older people, aged 41 to 50, believe that using m-Health services needs a lot of effort while for those, aged 21 to 30, the situation is quite opposite. On the other hand, facilitating conditions and performance expectancy seems most important to the age segment of 31 to 40 years. This result is an outcome of the time of the penetration of this technology in Bangladesh. People, in general, today are more experienced in using technological products/services than they were several years ago and since m-Health is a new concept for the local citizens, such findings are not surprising. Local older people are already used to and are comfortable using traditional and physical sources for healthcare services and they are not very much exposed or used to mobile phones and internet technology compared to the new generation. This situation is just another consequence of the recent globalization and affordability of technology across the world. Similar results were also identified by Gilbert et al. (2004) and Jung (2008) in their studies. The implication here for business is that, instead of developing m-Health services from the holistic viewpoint, marketers may customize their services to allow mature customers to choose a simple m-Health version. Another implication may be to offer an advanced level of service package to customers who are aged below 21 or over 30 with different innovative services and higher relative advantages. Since Bangladesh has a young population, with 60% of the population under the age of 25, marketers may consider them as their prime target market over older generation for the use of m-Health services.

Moreover, gender too has an important role to play in terms of shaping behavioral intention towards the use of mobile health services in Bangladesh. As per this study, male respondents are found to be more price sensitive than female respondents with a higher effort expectancy rate. This finding is partially consistent to Laukkanen and Pasanen (2008) and Cruz et al. (2010) in terms of price sensitivity. However, it opposes the findings of Venkatesh and Morris (2000) with regard to effort expectancy. Implications for managers will therefore be to boost the adoption rate of m-Health services particularly for the male city dwellers. A favorable price appeal may be used to address the price sensitivity issue and special demonstrations, trainings, articles or free trials regarding m-Health services may also help in this case.

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study has several limitations like other empirical past studies. First, the conclusions drawn from this study are based solely on the urban population, specifically people residing in Dhaka city of Bangladesh. Future research can explore the behavioral intention of people of other major cities or even the rural areas of the country. Second, a longitudinal study can be adopted in future works to examine and compare the research model in different time periods. Moreover, there can be various other variables that can influence the acceptance and use of m-Health services. Further research considering different constructs can enhance the understanding of precise determinants for m-Health services in Bangladesh. Finally, the model has been generalized and is only tested in a very specific condition of healthcare mobile services in a single country. Hence, panel data can be gathered regarding m-Health services from different developing countries and compared to do a more constructive analysis.

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Chapter 3
Customer Value Dimensions in E-Healthcare Services: Lessons From Finland

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ABSTRACT

Healthcare services have been extensively researched for customer value creation activities. There has been, however, limited attention on the dimensions of customer value, as reported by customers themselves, in e-healthcare services. The purpose of this paper is to investigate customer value dimensions in which customers experience e-healthcare services. Narrative techniques were used to investigate customer experiences of e-healthcare services offered by eight private Finnish providers. The findings show that customers evaluate e-healthcare services in four value dimensions: 1) The outcome of e-healthcare service ('What'), 2) The process of e-healthcare service ('How'), 3) The responsiveness and temporal aspect of e-healthcare service ('When'), and, 4) The location of e-healthcare service provision ('Where'). The value dimensions reflect customer expectations that service providers can fulfill for improved customer value creation. To the best of the authors' knowledge, this study is one of the first researches to investigate customer value dimensions in e-healthcare services in Finland.

INTRODUCTION

The healthcare provision system in Finland is lauded for its success in providing good healthcare. According to a study reported in October 2013 in the Finnish largest newspaper, Helsingin Sanomat, approximately 93% of customers are satisfied with the healthcare services of private healthcare providers. On the other hand, the corresponding figure for public healthcare providers was 85% (Toivonen, 2013). Healthcare services in Finland are based on the welfare state model. In this system, the major part of

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healthcare services is provided by the state and municipalities (Teperi, Porter, Vuorenkoski, & Baron, 2009). The Pharma Industry Finland states that in Finland, approximately 20% of healthcare expenditure is paid by households. This complements the expenditure incurred by the State (approx. 24%), municipalities (approx. 40%), and social insurance institution KELA (14%) in Finland (Lääketeollisuus, 2015).

Finland has also made excellent progress in introducing e-healthcare practices and systems around the country. The first steps in e-healthcare were taken in 1998, when pilot projects were taken to integrate patient record information systems from multiple suppliers into an integrated regional database (Alapekkala, 2015). Today, e-healthcare systems in Finland include a number of processes, such as, e-prescription, patient electronic health records with 100% national coverage, and, patient eCards among several other initiatives (Doupi et al., 2010). Notwithstanding these initiatives on the institutional level, the customers' valuation of e-healthcare in Finland is yet scarcely investigated.

Healthcare services have been extensively researched for investigating service quality and customer value creation activities (McColl-Kennedy, Vargo, Dagger, Sweeney, & Kasteren, 2012; Gummerus, 2010; Nambisan & Nambisan, 2009). There has been, however, limited attention on the dimensions of customer value, as reported by customers themselves, in e-healthcare services. The purpose of this paper is to investigate the dimensions of customer value through which customers evaluate and experience e-healthcare services in Finland. We conceptualize e-healthcare as a service that customers experience and evaluate. For this research, we characterize patients and their caretakers (friends and family) as 'customers' in the e-healthcare context. Customers use e-healthcare channels themselves for seeking various benefits. Some of the key benefits that customers avail from e-healthcare services include information gathering and scheduling appointments at clinics. In this paper, we investigate and analyze the customers' evaluation of private e-healthcare services and present a four-dimensional value categorization framework as an outcome of research.

The paper is structured as follows: first, we describe the concepts of e-healthcare, smartphone apps, and, customer value creation in the literature review section. Next, we present the methodology and the empirical study conducted for this research. Subsequently, we present the findings and analyze the value dimensions from e-healthcare service into a four-dimensional framework. Last, we present the discussion and implications of the findings.

LITERATURE REVIEW

E-Healthcare as a Service

E-healthcare services consist of the use of electronic information and communication technology in the health and wellness sector. The term 'e-health', 'e-healthcare', 'health e-service' and 'e-health service' are interchangeably used in academic and managerial literature (Eysenbach, 2001). Several definitions understand e-health as synonymous with 'healthcare through internet'. This term broadly refers to any electronic exchange of health-related information through electronic channels (such as websites and smartphone apps) (Deluca & Enmark, 2000; Gummerus, Liljander, Pura, & van Riel, 2004; Kind & Silber, 2004; Kwankam, 2004).

In this paper, we use the term 'e-healthcare' and ascribe to the World Health Organization's (WHO) conceptualization of e-health. WHO defines e-health as "the transfer of health resources and healthcare by electronic means" (WHO, 2014). It identifies three core areas in e-health: a) delivery of health

information, b) use of IT for improving public healthcare, and, c) use of e-commerce and e-business in healthcare (WHO, 2014). The use of e-health practices has enhanced research, healthcare networking, and improved healthcare service on local and global levels (Cashen, Dykes, & Gerber, 2004).

The goals of e-healthcare include increased service quality and efficiency in healthcare, empowerment of patients and caretakers through information delivery, and, the development of e-commerce systems in healthcare service provision (Austin & Boxerman, 2003). From a global perspective, e-healthcare can be used to disseminate information and e-medial consultation over the internet (Andersson, Rosenqvist, & Ashrafi, 2007, Kwankam, 2004). E-healthcare networks can reduce time and distance barriers and can help to ensure that collective knowledge is utilized to solve healthcare challenges throughout the world (Kwankam, 2004). In this paper, we investigate the ways in which Finnish customers evaluate private e-healthcare services in creating value for themselves.

Smartphone Apps as E-Healthcare Enablers

Smartphone apps have recently emerged as a new marketing and service channel. Apps such as 'Angry Birds' offer gaming as a service where entertainment is the key benefit offered to the user (Dube, 2014). In research, apps have received recent attention in branding (Bellman, Potter, Treleaven-Hassard, Robinson, & Varan, 2011) and consumer technology adoption literature (Racherla, Furner, & Babb, 2012). Recent research examines the impact of apps on issues such as, facilitators of multiple customer experiences (Dube & Helkkula, 2015; Dube, Helkkula, & Strandvik, 2015), web-usage (Kellogg, 2011), customer service jobs (Troianovski, 2013), and continental economies (European Commission, 2014).

Smartphone apps can be developed as 1) a new service concept (e.g. Shazam app records any piece of music and provides information on the artist, genre and recording studio); 2) a new client interaction channel (e.g. banking app); 3) a service delivery system (e.g. health information provider apps such as WebMD), and, 4) new technological options (e.g. Runkeeper app provides runners their jogging and exercise statistics). Therefore, apps can be characterized as service innovations that make use of new types of creative ideas. Smartphone apps are not mere extensions of websites as they differ from websites in several ways, such as, accessibility, usability, functionality, and, capabilities (Racherla et al., 2012). Thus, the access to various apps and their functionality depends to a large extent on each smartphone's capabilities and the operating system used to run the smartphone.

In e-healthcare context, smartphone apps possess immense potential in the role of service enablers. Apps can function as an easily accessible information source on healthcare topics and for general self-diagnosis. A good example of such an app is WebMD app that provides information on various health-care topics, such as, symptoms, home-remedies, health tracking, pregnancy and medicine information (WebMD, 2014). Gummerus, Liljander, & von Koskull (2013) argue that electronic healthcare related information can help patients in dealing with potentially stressful and anxiety inducing health conditions. This phenomenon is evident in the case of apps from healthcare information providers, such as WebMD and Mayo Clinic (Mayo Clinic, 2014), that assist patients (and their caretakers) to cope up with health conditions.

Customer Value Creation in E-Healthcare

Extant research in the field of value creation has explored customer value from three distinct perspectives (Lindberg-Repo & Dube, 2014). The first perspective is known as 'Customer-Perceived-Value'

(CPV) that has its genesis in the concept of 'Perceived-Service Quality' (Grönroos, 2007). In this value perspective, customers evaluate the value from a service in terms of benefits achieved from the service versus the sacrifices made by the customer in achieving those benefits. Thus, CPV is understood as the customers' net value perceptions based on benefits and sacrifices with process, outcome, time and location dimensions (Heinonen, 2004). This value perspective has evolved from the service quality research and treats customer value as 'perceived'. Ramsaran-Fowdar (2008) demonstrates this linkage in the context of private healthcare services in developing a specific service quality scale.

The second value perspective focuses on service use and argues for an ongoing value emergence process where value is created by a customer during the use of service (Heinonen & Strandvik, 2009). The specific attention on the use of service highlights the process nature of service where not only the value outcomes, but also the value creation process is evaluated by the customer (Gummerus, 2013). In e-healthcare, Misra, Mukherjee, & Peterson (2008) have identified four distinct virtual community member segments that create value-in-use in discussions in virtual healthcare discussion websites and forums.

Recent research has further developed the concept of value-in-use to expand it into 'value-in-experience' (Helkkula, Kelleher, & Pihlström, 2012). Value-in-experience research calls attention to the overall service experience of the customer. In this expanded value perspective, researchers investigate the customer's phenomenological service experience that stretches beyond the current service use and may include past as well as future imaginary service experiences (Helkkula et al., 2012). The three value concepts: 'customer-perceived- value' (CPV), 'value-in-use' and 'value-in-experience' together illustrate the evolution of customer value research.

In all these conceptualizations, the role of the customer is central (Heinonen et al., 2010). The emphasis on customers' use/experience of service gives rise to the related concept of 'value co-creation' where value is co-created in service use. The term 'co-creation' in case of value emergence implies that both customers and service providers are active in the process of value creation. There are, however, two divergent views on the role of customer and service provider in value co-creation. On one hand, researchers, such as Grönroos, Ravald and Voima (Grönroos & Voima, 2013; Grönroos & Ravald, 2011) emphasize that customers are the primary value creators and service providers are the facilitators and co-creators of value. These researchers also claim that value co-creation occurs only during customer-firm interactions. On the other hand, researchers such as, Vargo & Lusch (2008, 2004) claim in their emergent 'service-dominant logic' (SDL) that value co-creation occurs during the entire consumption process as service providers' skills are embedded in the product/ service used or experienced by the customer. To summarize, customer creates (or co-creates) value through creation (or co-creation) activities in which the service provider acts as a facilitator and co-creator (or creator) with the customer.

In healthcare research, McColl-Kennedy et al. (2012) have identified customer roles, activities and interactions in customer value co-creation with healthcare services. They put forth a healthcare 'Customer Value Cocreation Practice Styles (CVCPS)' typology with five distinct value co-creation practices that customers undergo with healthcare services. In the context of e-healthcare services, Ouschan, Sweeney, & Johnson (2006) have found out that customers co-create value with physicians through improved patient-physician communication and increased patient participation in healthcare through electronic channels.

METHODOLOGY

This paper employs a qualitative phenomenological approach in using customer narratives as empirical material for the research. Phenomenology is an appropriate research methodology when the key purpose of research is to analyze customer experiences and the ways in which customers make sense of their own experiences (Ardley, 2011; Goulding, 1999; Thompson, 1996). To understand the customer experience of e-healthcare services, we have made use of narrative interview techniques in which customers describe their e-healthcare experiences and value creation activities. We have used such customer narratives of private healthcare experiences as the data for our analysis. This narrative data from the respondents reveals the approaches that customers use in making sense of their value experiences with e-healthcare services (Shankar, Elliott, & Goulding, 2001).

We conducted semi-structured interviews with customers of eight private Finnish healthcare providers: Eiran Sairaala, Diacor, Dextra, Bulevardin Klinikka, Mehiläinen, Terveystalo, Aava and Laser Tilkka. We chose these private healthcare clinics as our research sites because they are the largest private healthcare service providers and cater to the bulk of private healthcare customers in Helsinki Metropolitan Region. Prior permission was taken from the clinics to interview their customers, and the interviews were conducted on-site, in the waiting halls, and, payment and reception areas of the clinics.

Semi-structured interviews are suitable for exploring the self-interpretation of respondents' experiences with service providers (Silverman, 2013). We used a conversational style narrative interview technique (Stokes & Bergin, 2006) to facilitate the respondents to reflect and evaluate their customer experiences with private healthcare clinics. We had developed beforehand printed interview guides with specific themes that should be discussed in the semi-structured interviews. The specific themes included in the interview guide were: (a) respondents' length and quality of relationship with particular private clinic (b) the type of healthcare services availed by the respondent (c) the type of e-healthcare services availed by the respondent, both with the particular clinic and in general (d) respondents' evaluation of the e-healthcare services in relation to their benefits (e) respondents' suggestions for improvements of e-healthcare services.

The respondents for the interviews were purposely selected based on two criteria. First, the respondent must have used healthcare services of private healthcare clinics in the last three years either for personal or for occupational healthcare. Second, the respondent must be aware of and have used at least one e-healthcare service with private healthcare providers. The interviews were conducted in Finnish in Helsinki Metropolitan Region with 170 customers in total. The duration of the interviews was between 13 to 26 minutes each. Table 1 shows the number of respondents interviewed from each of the eight chosen private healthcare providers.

The interview transcripts were first analyzed individually and subsequently color coded into different value creation themes. The value creation themes were based on the customers' evaluation of e-healthcare service benefits that the customers experience in their interactions with private healthcare clinics. Next, a cross-comparison of narratives of different respondents was done. The cross-comparison helped in identifying the common customer value themes across (a) the respondents and (b) across private healthcare providers. In the next step of the analysis, the common themes were condensed together into a four dimensional customer value framework. This value framework included themes relating to the e-service outcome ('What'), e-service process ('How'), temporal use of e-service ('When'), and, spatial use of e-service ('Where').

Table 1. Empirical study design

	Private Healthcare Service Provider	Number of Respondents
1	Mehiläinen	36
2	Laser Tilkka	31
3	Bulevardin Klinnika	31
4	Dextra	27
5	Eiran Sairaala	26
6	Diacor	7
7	Terveystalo	7
8	Aava	5
	Total	170

FINDINGS

The analysis of customer narratives shows that in Helsinki Metropolitan Region, customers avail e-healthcare service of private healthcare providers primarily through two key e-channels: a) healthcare provider websites, and, b) smartphone apps. The apps used also include those apps that are not associated with any of the Finnish private healthcare providers. Such apps are still relevant to be included in the analysis of narratives as they impact the usage of Finnish private healthcare provider websites. This phenomenon was evident in the case of several respondents who decided to go to a particular private healthcare provider, such as Mehiläinen, depending on whether or not a public app such as WebMD answered customers' queries in home-diagnosis.

The customer narratives were analyzed to first identify what value features in general customers appreciate with private healthcare services in Finland. According to the customer narratives, the most essential characteristics, when evaluating private healthcare services, are:

- The knowledge and capabilities of the personnel;
- Personnel's attitudes and behavior;
- The individuality of the service;
- The accessibility of the doctors/experts after the visits.

Next, we analyzed the customer narratives of their experiences with the e-healthcare services provided by Finnish private healthcare providers. For customers, the healthcare provider website is the main e-service platform, followed by smartphone apps. In evaluating the e-service, the following characteristics of websites and smartphone apps were highlighted by the respondents:

- The ease of use of the website and smartphone app;
- The amount of information provided in the website and smartphone app;
- The affirmation of the professionals' competence through the website and smartphone app.

Further analysis of the customer e-healthcare narratives resulted in a four dimensional customer value framework. The four dimensions of customer value are illustrated and described through the following excerpts from customer narratives:

The Outcomes of E-Healthcare Service ('What')

This e-service customer value dimension relates to the *outcome benefits* that customers experience with private e-healthcare services. The outcomes can be in the form of:

1. Gaining access to health-related information;
2. Gaining access to information about the skills and expertise of doctors; and
3. Knowledge about the facilities provided by the clinics, such as, washrooms, coffee machines, and, payment systems.

A 67 year old female from Mäntsälä in Finland identifies information provision as a key value determinant. According to her, credible information on the clinic website about the expertise of doctors in Bulevardi Klinikka is important for her. She does not consider healthcare service fee as an important value determinant for her as long as she gets good and credible care from expert doctors:

I want to find online the expertise levels of doctors in Bulevardi Klinikka. Good care from talented doctor is most important for me! I don't care how much it costs; money is useless if I am sick. (Female, 67, Mäntsälä, Finland)

A 46 year old male from Helsinki in Finland recalls finding the right expert online for his medical condition as a key outcome benefit. He describes his experienced benefit of finding the right doctor on the website of a private healthcare provider for his specific medical condition:

I had a very painful intestinal problem. At the civic medical center I didn't get any treatment, only got advice to wait for the symptoms to subside, and to eat painkillers. So I checked online the website of Dextra, and found the right doctor to consult for my problem. I got very good care from that doctor. (Male, 46, Helsinki, Finland)

The Process of E-Healthcare Service Delivery ('How')

This dimension of e-healthcare value refers to the process nature of e-healthcare services. The process of e-healthcare service refers to the different elements of websites and apps that the customers evaluate while using them. The process dimension of customer value included:

1. Design, colors, language and other functional features of websites and apps; and
2. Online support, including live-support through chatting.

One of the English speaking customers of Laser Tilkka finds the English webpages of the website lacking in quality, thus affecting adversely for him the process of retrieving information about the clinic:

English websites are often quite poor. For Laser Tilkka also it is unsatisfactory. Because of this I am not able to find out relevant information about the clinic and their services. I feel quite frustrated in the entire process of translating the website paragraph by paragraph. (Male, 27, Helsinki, Finland)

A 40 year old customer of Mehiläinen praises the website and chat support provided by Bupa Medical Insurance provider. This customer avails of Mehiläinen's occupational health services through Bupa that authorizes the customers' planned visits to the hospital:

Staff behavior and attitude creates the credibility of the service provider. I even evaluate the behavior of the person chatting with me on Bupa insurance website through which I have medical insurance. That person authorizes my visits to Mehiläinen and he does it very professionally. (Male, 40, Vantaa, Finland)

The Timing of E-Healthcare Service Delivery ('When')

This dimension of e-healthcare value refers to the time availability of e-healthcare service. Websites and apps provide round the clock availability of e-service; however, customers also noted the help provided by e-services in using physical services of private healthcare clinics. The temporal facilitation provided by e-healthcare services included:

1. Online booking of doctor's appointment;
2. Online booking of laboratory tests appointment; and
3. Appointment reminders sent through smartphone apps and as text messages.

The telephone booking call times are ordinarily constrained by the working hours of the call-center service used by the Finnish healthcare providers. A 35 year old female, however, finds the website of Dextra as a useful tool in scheduling her appointments. The 24 hour website scheduling service makes appointment booking a time unconstrained process:

If I can't go to the hospital, or call their telephone service, I can always check out their website for booking the next available time suitable for my schedule. The online booking system is very flexible. (Female, 35, Helsinki, Finland)

A 32 year old mother thanks private healthcare provider for sending reminder email for the laboratory test appointment of her daughter:

I had completely forgotten the appointment of my daughter for laboratory test. I got an email one hour before the appointment, and I checked it with my smartphone. Thankfully I could still reach the clinic on time for the appointment. (Female, 32, Espoo, Finland)

The Location of E-Healthcare Service Delivery ('Where')

This value dimension refers to the spatial service characteristics of e-healthcare services. Smartphone apps are a useful tool in accessing healthcare service anywhere, as apps travel with the customers in their smartphones. The spatial dimension of customer value included:

1. Address location service provided by websites and smartphone apps; and
2. Map and driving instructions provided by websites and location smartphone apps.

A 29 year old male describes his use of WebMD app for finding information on minor symptoms so that he does not have to go to Diacor, which is his private healthcare provider:

I don't want to run to my hospital for every small problem I have as I live quite far from my Diacor. Instead, I consult the WebMD app for self-diagnosis. (Male, 29, Helsinki, Finland)

A 46 year old female from Vantaa describes her search for the address of Dextra private clinic located in Munkkivuori region of Helsinki:

I had an appointment at the Dextra in Munkkivuori. Now, this particular clinic is at the shopping center in Munkkivuori, and I needed specific instructions on how to drive there and where can I leave my car. I used the website of Dextra and Google Maps to reach there without any problem! (Female, 46, Vantaa, Finland)

The above mentioned excerpts from customer narratives illustrate the use of websites and smartphone apps as e-healthcare channels by customers in Helsinki Metropolitan Region. The narratives are analyzed and a four dimensional value framework including 'What', 'How', 'When' and 'Where' of e-healthcare service value is presented. Table 2 illustrates the four dimensional framework with customer evaluation criteria for each of the four dimensions.

DISCUSSION

Since the last few decades, the concept of customer value has captured the imagination of researchers in the field of marketing. Summarizing the trends in value literature, Gummerus (2013) has put forth two broad streams in value research. She claims that value creation processes and value outcomes are

Table 2. Four-dimensional customer value framework with customer evaluations

Value Outcomes	Value Processes	Temporal Dimension of Value	Spatial Dimension of Value
'What'	**'How'**	**'When'**	**'Where'**
Gaining access to health-related information	Design, colors, language and other functional features of websites and apps	Online booking of doctor's appointment	Address location service provided by websites and smartphone apps
Gaining access to information about the skills and expertise of doctors	Online support, including live-support through chatting	Online booking of laboratory tests appointment	Map and driving instructions provided by websites and location smartphone apps
Knowledge about the facilities provided by the clinics, such as, washrooms, coffee machines, and, payment systems		Appointment reminders sent through smartphone apps and as text messages	

the two value research streams that have emerged over the years; however, the concept of value still remains elusively defined.

This study identifies a four-dimensional value framework for e-healthcare service among customers of private clinics in Finland. The four dimensions are related to both the e-healthcare service process and service outcome, as evaluated by the customers. In addition, the customers identify two additional e-healthcare service value dimensions that relate to the timing and responsiveness of e-healthcare service and location of the customer. Thus, the four value dimensions this research investigates the customers to experience with e-healthcare services relate to the:

1. Outcome of e-healthcare service – 'What'
2. Process of e-healthcare service – 'How'
3. Timing of e-healthcare service – 'When'
4. Location and access of e-healthcare service – 'Where'

The question themes 'What', 'How', 'When' and 'Where' portray the outcome, process, temporal and spatial aspects of services. These question themes were instrumental in developing our pre-understanding of customer value in e-services. Furthermore, we have expanded the scope of customer evaluation of services with such four-dimensional framework by presenting specific customer evaluations of e-healthcare services (Table 3).

It is to be noted here that similar four dimensional value frameworks have been identified in other contexts. To the best of our knowledge, however, this paper is a pioneer effort to investigate four-dimensional value framework in e-healthcare context. Such value frameworks reflect the customers' valuation schema that they use for assessing services. In branding research, Lindberg-Repo & Grönroos (2013) argue for a four-dimensional customer value framework that includes value proposition, value promise, value delivery and value fulfillment dimensions. Similarly, Heinonen & Strandvik (2009) have proposed a four-dimensional value-in-use framework for monitoring and management of value-in-use by service providers.

The findings of this research have two key contributions. First, this study contributes to value literature in expanding the four-dimensional value framework to apply to an e-healthcare context. The four value dimensions also represent the four ways in which electronic and technological capabilities arising out of service innovations can enrich the customer healthcare experience and improve or enhance the customer created value.

Second, to the best of our knowledge, this is the first study to investigate customer value dimensions of e-services provided by Finnish private healthcare clinics. The value dimensions also demonstrate the ways in which e-systems help in augmenting and enriching the customer experience as patients.

Table 3. Four-dimensional customer value framework with e-healthcare services

'What' of e-healthcare experiences Improved benefit for the patient	**'How' of e-healthcare experiences** Improved service delivery process
'When' of e-healthcare experiences Time and access to healthcare	**'Where' of e-healthcare** Location and communication with healthcare provider

IMPLICATIONS

The findings of this study have several implications for researchers and managers of e-healthcare services. Similar studies have been conducted in Sweden (Nordgren, 2009) focussing on service productivity with e-healthcare. This paper, however, theoretically contributes in highlighting the customer perspective and customer experience with e-healthcare. The four-dimensional value framework illustrates both the conceptualizations of customer perceived value (CPV) and value-in-use that customers utilize in evaluating the e-healthcare service (Heinonen & Strandvik, 2009; Heinonen, 2004). Also, the use of smartphone apps and websites by customers in accessing healthcare reflects the value co-creation processes through which healthcare providers and customers can together create value (McColl-Kennedy et al., 2012).

Previous research has demonstrated the role of virtual communities revolving around a healthcare website in customer value creation (Misra et al., 2008). For managers, this study shows the value frameworks that customers use in evaluating e-healthcare services through both websites and smartphone apps e-healthcare channels. Thus, healthcare providers should focus on developing the four aspects of outcomes, process, timing and location in developing holistic e-healthcare solutions in the form of websites and smartphone apps.

LIMITATIONS AND FURTHER RESEARCH

This study is limited to the investigation of e-healthcare services in Finland. Furthermore, we have specifically focussed on private healthcare service providers and their e-healthcare services as the research context. We encourage further research in investigating the value dimensions of e-healthcare to cover public healthcare and national healthcare systems on a macro level. In addition, we suggest that the value dimensions of e-healthcare services should be examined in other countries with different healthcare systems as compared to Finland.

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Chapter 4
Realizing the Value of EHR Systems Critical Success Factors

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ABSTRACT

Now that a majority of hospitals and primary care physicians have made the transition to electronic health record (EHR) systems, realizing value from this investment has become a major issue. The issue raises two key questions: Why do so many EHR implementations continue to fall short of achieving intended healthcare outcome goals? What differentiates those that succeed from those that fall short? This article builds on prior research using a systems framework to analyze the EHR implementation process. It focuses on ten common themes (CSFs) that appear to differentiate institutions which achieve positive healthcare outcomes from those that do not. Results are highly relevant for healthcare institutions now seeking to focus on realizing the value of their EHR systems.

INTRODUCTION

Now that a majority of hospitals and primary care physicians have made the transition to electronic health record (EHR) systems, realizing the full value from this investment has become a major issue. A recent College of Healthcare Information Management Executives (CHIME) survey indicates that optimization of EHRs will be a top priority in the next year for over 70 percent of respondents (Leventhal, 2015). This is hardly surprising since health IT implementation projects frequently fall short of achieving their potential. In fact this result is true of IT implementations across all industries; research indicates that half or more of IT projects continue to fall short of target goals (Aguirre, 2014). The key question for EHR implementation is what differentiates initiatives that succeed from those that fall short? This article builds on the authors' earlier research examining organizational EHR implementation from a systems framework to identify factors that differentiate institutions that achieve positive outcomes from

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those that report little to no impact and sometimes negative results. The primary aim is to identify what healthcare organizations that achieve the best results share in common that may account for their success in 'meaningfully using' health IT to improve care delivery.

A publicly subsidized demonstration project that implemented comprehensive, point-of-care, clinician-centric health IT systems in 20 New York city-area nursing homes illustrates the problem. The research findings reported considerable variation in outcomes:

Despite the fact that each home implemented the same software and hardware via the same vendor, there have been variations observed both by early research findings and by the 1199 Training Fund coordinators about how the adoption of HIT has affected, and has been used by, homes. Examples of these differences range from how homes responded to bugs in the HIT system, to whether the technology was fundamentally perceived as a means of improving clinical indicators, financial outcomes, employee efficiency, or the entire culture of a home and perceived time savings. Variation was also reported in use of available health IT data. The quality improvement possibilities inherent in these capabilities are very rich, but not all homes have engaged in these types of analyses and customizations, and those that did, pursued different strategies. (Klinger & White, 2010)

Although there is a growing consensus that health information technology and exchange play foundational roles in addressing cost, quality, and access challenges of the United States healthcare system, prescriptions for how to get there successfully vary widely. Frequent failure to achieve intended healthcare outcomes is evident in the growing attention being placed on EHR "optimization" and "realizing the value of health IT." Despite well-established methodologies and recommendations for managing health IT implementation initiatives, the same lessons continue being learned through trial and error by clinicians, health IT specialists, and healthcare systems of every ilk. The cost is significant in dollars and results, with some experts reporting failure to achieve intended results 50 percent or more of the time (Keshavjee, 2006; Leviss, 2010; Goroll, Simon, Tripathi, Ascenzo, & Bates, 2009). Studies assessing the impact of EHRs tend to focus on technical factors, overlooking the possibility, as systems theory would suggest, that lack of results may be attributable to people, process, and other dynamics of the healthcare setting rather than the technology itself.

Systems theory provides a framework for viewing health IT implementation holistically as opposed to reductionisticly. It recognizes the extremely complex dynamics of the healthcare environment. The objective is not just to look at individual factors, but to also look at the complex interaction of people, process, and technology to gain better insight into differences in outcomes.

Our initial study findings (Regan & Wang, 2015) identified ten context, process, and technology variables that appear to differentiate institutions which have been most successful in achieving *meaningful use* (i.e., optimizing or achieving the value of EHRs). In order to further validate and clarify previous findings, this second phase of the study compared additional examples of EHR implementation and related research on the systemic nature of innovation and change. Results are highly relevant for healthcare institutions now seeking to focus on realizing the value of their EHR systems. The intent is to move beyond basic questions of whether health IT creates value to focus more on understanding ***how*** the technology can be "meaningfully" used to transform care delivery to achieve the primary aim of increasing patient access and improving quality of patient care at reduced costs (Jones, 2014, p.52).

BACKGROUND / LITERATURE REVIEW

As the momentum for transitioning to electronic health records accelerates, the national focus has shifted from buying and using the technology to sharing information across the continuum of care and transforming the United States health care system. Many observers believe that national momentum for healthcare change has reached the "tipping point," in the terminology of Malcolm Gladwell. However, the challenges of realizing value from investments in transitioning to EHR systems on a national basis remain daunting. Buy-in among healthcare professionals continues to be problematic (Khoja, 2013; Coplan, 2013; Heisey-Grove, 2014).

To further validate and clarify previous findings, the second phase of research has focused on identifying additional multifunctional health IT interventions published since 2012. Research reports and case studies, both success stories and failures, evaluated in the first phase of this project identified a wide range of variables believed to impact outcomes. These variables, which relate to people and process as well as technology, are presented in the form of incentives, barriers, lessons learned, implementation guidelines, and others. Lau et al. (2012) identified over 100 factors in their review of 43 selected studies. Table 1 and 2 provide two representative frameworks showing the many variables associated with successful implementations of EHR systems. Table 1 is based Karim Keshavjee et al.'s (2006) systematic review of EHR implementation frameworks. They concluded that existing EHR implementation frameworks did not explain all elements experienced by implementers and have not helped to make EHR implementation any more successful. Table 1 summarizes their overarching framework that integrates multiple conceptual frameworks with the goal of explaining factors that lead to successful EHR implementation. Table 2 is based on the work of Dr. Kenneth G. Adler, MD (2007). He organizes the key factors of EHR implementation into three categories: team, tactics, and technology. His summary is intended as a practice guideline for practitioners of a successful EHR implementation. To a large extent it parallels the framework offered by Keshavjee et al., (2006) yet it also includes some different emphases. Although informative, these studies do not address the issue of why so many EHR implementations fail to achieve anticipated benefits.

Some of the myriad of variables might be considered in the category of sound planning and project management. Some may be particular to a given project; others are common across all projects. All the variables potentially influence the outcomes of any given project. However, missteps in addressing many of these factors often are correctible. The missteps may result in slowing down progress or require going back and modifying initial plans. However, they do not necessarily doom a project. Yet we also know that over half of health IT projects do fail, either falling short of intended improvements, leading to disuse, or resulting in cancellation. The question raised by our current study is whether, among all the many variables that must be addressed, it is possible to identify some that are critical to success; that is, they consistently make or break projects across many settings and projects. A related question is whether the critical success factors might change over time as implementation of health technology progresses along the adoption curve. In other words, are the factors the same among innovators and early adopters as they are among, the early majority, and will be among the late majority and laggards? For example, might the critical factors change as healthcare innovation passes the "tipping point," as the momentum and evidence build? Another interesting aspect of this question is to what extent it is realistic to expect institutions to learn from the experience of others and to what extent each institution needs to go through the tough learning curve on its own.

Table 1. Recommendations for Planning and Implementing EMR Systems

Critical Questions	People, Process, or Technology (description)
PRE-IMPLEMENTATION PHASE	
• Whose vision is it? • Why are we doing it? • What is the mission of project?	• **Governance (people)** - A senior management's activities or substantive personal intervention in the management
• Who is in charge?	• **Project management leadership (people)** – Bridge between top management and other stakeholders o Project Manager - Plan, motivate, evaluate EMR, etc. o Project Champion – Gain enthusiasm within work group ▪ Within large organization – Use EMR Committee
• How does it help the organization or employees? • Does it make "my job" easier?	• **Analyze state of 'organization's readiness' (process)** o Prepare for the change o Demonstrate benefits to all addressing barriers or obstacles
• What do all stakeholders think?	• **Involve multiple stakeholders (people)** - Gain active participation and effective support
• What applications, features, etc., are needed?	• **Carefully select software, hardware, databases (process)** o Conduct thorough needs analysis o Systematically evaluate technology alternatives
• Can all data be accessed where ever or whenever needed?	• **System interoperability (technology)** o Integrate with existing information systems o Develop strategy to pre-load all existing data
• How is each feature used?	• **Technology usability (technology)** o Hardware – placement, type, and ease-of-use of devices o Software –user interfaces and support of clinical workflows and processes
IMPLEMENTATION PHASE	
• How will my job change?	• **Workflow and redesign (process)** o Understand the patient care process o Fit staff and physicians clinical workflows together
• How do I do this?	• **Training (people)** o Initial provided by vendor in language of users o On-going required to gain expertise
• What problems do we have?	• **Strong vendor partnership (people)** o Responsive to identified system modifications or improvements during the implementation o Efficient and effective on-site help desk o Select and develop 'super-users' within the organization
• Who's going to help when you leave?	• **Support (process)** o Develop strategy for ongoing support
• Who do I talk to about a problem?	• **Feedback and dialogue (people)** o Regular staff / review meetings o Trouble-tracking systems with reports o Continuous implementation evaluation, monitoring, and tracking
• Whose record is it?	• **Privacy and confidentiality (process)** o Must meet continually changing legal requirements o Requires trade-offs between confidentiality and access
POST-IMPLEMENTATION PHASE	
• What happens in an emergency?	• **Technical support and business continuity (technology)** o Vendor contract agreements specify levels of support o Business continuity plan identifies roles, responsibilities, processes
• Where do we find continuing help?	• **User groups (people)** o Scheduled user meetings led by EMR champions increases user acceptance o On-going system refinements increase user satisfaction
• Why should I bother?	• **Incentives (process)** o Reinforce benefits to users and improved patient care o Demonstrate cost and time efficiencies

(Regan & Wang 2015; adapted from K. Keshavjee, et al. 2006)

This second research phase has focused specifically on the 10 variables (factors) that appear to differentiate success from failure, which were identified in our original study (Regan, 2015). The research sought to provide additional insight into how and why these variables might influence project success as well as to confirm that the issues identified earlier continue to persist as methodologies for EHR implementation mature. In addition, evidence was sought for other possible variables associated with success or failure. We also sought to delve more deeply into issues related to the systemic nature of healthcare innovation. Four prior studies have been identified to date that address the same questions as the current study in trying to determine what factors distinguish health IT implementations that achieve their intended goals from those that fail or fall short (Adler, 2007; Keshavjee, 2006; Jones, 2014; Lau,

Table 2. The Three T's of a Successful EHR Implementation

Team	Tactics	Technology
Senior support and project champion • Identify one or more EHR champions or don't implement • Make sure your organization's senior executive fully supports the EHR **Project manager and management** • Use an experienced, skilled project manager • Utilize sound change management principles **Goals and expectations** • Have clear, measurable goals • Make sure users share your goals • Establish realistic expectations • Don't try to implement an EHR in a dysfunctional organization	**Process - planning** • Plan, plan, plan • Redesign your workflow • Don't automate processes just because you can; make sure the automation improves something • Design a balanced scanning strategy **Process - implementation** • Pick a vendor with an excellent reputation for support • Utilize a phased implementation • Consistently enter key data into your new EHR charts • Get data into the EHR electronically when possible • Don't "go live" on a Monday • Lighten your workload when you "go live" and for a short period afterward **People** • Train, train, train • Be flexible in your documentation strategy and allow individual differences in style • Don't underestimate how much time and work is involved in becoming "expert" with an EHR • Utilize "power users" at each site	**Hardware** • If you're a small practice, consider an Application Service Provider (ASP) model. • Don't scrimp on your IT infrastructure. • Make sure your servers and interfaces are maintained on a daily basis. **People** • Make sure that your IT personnel do adequate testing. • Utilize expert IT advice when it comes to servers and networks. **Process** • Back up your database at least daily. • Have a disaster recovery plan and test it.

(Regan & Wang, 2015) Taken from Adler (2007). "How to Successfully Navigate Your EHR Implementation."

2012). Three other literature review studies focused on identifying barriers and incentives for adoption and use (Holroyd-Leduc, 2011; Mair, 2012; Lluch, 2011). However, a number of research studies and other analyses bring up issues related to contextual variables that appear to have influenced project results, which point to organizational interdependencies and the systemic nature of sustaining major organizational changes (Heisey-Grove, 2014; Hagland, M., 2014; Marchibroda, J., 2014; McCann, E., 2012; Punke, 2014; Singh, 2014). No studies have been identified that specifically use a systems framework to analyze the effectiveness of EHRs. However, the emergence in June 2012 of a new interdisciplinary journal, *Health Systems,* promotes the idea that all aspects of health and healthcare can be viewed from a systems perspective. The journal's underlying philosophy is that health and healthcare systems are characterized by complexity and interconnectedness, where "everything affects everything else." Therefore, the editors suggest, "problems in healthcare need to be viewed holistically as an integrated system of multiple components (people, organizations, technology and resources) and perspectives." (Brailsford, Harper, LeRouge, Payton, 2012, p.2)

Recent literature on innovation in healthcare also underscores the systemic nature of transformation (Christensen, 2009). In their study of disruptive innovation in healthcare, Christensen, Grossman, and Hwang (2009), focus on the interdependent nature of transformational changes. For example, in their discussion of disruptive business models, they state, "When disruptive innovators assume that relying on the existing value network is a cheaper, faster way to succeed, they invariably find that ensconcing their "piece" of the system into the old value network kills their innovation—or it co-opts and reshapes their disruptive business model so that it conforms to that system. Vice Versa never happens."

Dr. Harvey Fineberg, past president of the Institute of Medicine, stresses in a 2012 address the importance of thinking about healthcare from a systems perspective and always putting the patient at the center of the system. He cites statistics about the high error rates in U.S. medical care, and talks about the challenges of designing for safety in a complex tightly coupled system. He suggests that although we do not know all the answers to transforming U.S. healthcare, one thing we know for sure: Our U.S. medical system is perfectly aligned to get the results we are getting! He goes on to infer that if we want different results, we need to be willing to do things differently, to rethink the models through which we deliver care. He is also a strong proponent of the view that higher quality of care will lead to lower healthcare costs, and provides many concrete examples based on redesigning systems of care (Fineberg, 2012).

Insights into success versus failure can also be gained by looking at the nature of process (workflow) changes that organizations have made with health IT. Achieving the value of EHRs involves integrating across silos of care. The more successful organizations appear to have integrated process change with EHR implementation; whereas, less successful organizations often take an approach of implementing first, then addressing work process issues later. *Connected for Health*, a detailed case history of Kaiser Permanente's (KP) journey to transforming care and achieving the value of EHRs, underscores the systemic nature of transformation and stresses the centrality of strategic leadership. Editor Dr. Louise Liang, MD, served as executive consultant to Kaiser Foundation Health Plan, and from 2002 to 2009, she served as senior vice president, Quality and Clinical Systems Support, where she led the development and implementation of KP's *HealthConnect* $4 billion-plus transformation initiative (Liang, 2010). In his assessment of this effort, Dr. Donald Berwick, president and CEO of the Institute for Health Improvement, states, "Without clear incorporation into the actual process of care and without the re-engineering of those processes, and without the changes in norms, capabilities, and culture to allow those new systems to take root, KP *HealthConnect* would become what far too many other health care organizations had already discovered in their own modernization journeys: the computerization of a defective *status quo"* (Liang, p. xvi). Although some are quick to point out the uniqueness of KP as an integrated health system, their experience is instructive, and their former CEO George Halvorson, in reflecting on lessons learned, underscores the systemic nature of change (Liang, 2010).

Based on their targeted review of existing literature on health IT implementation and use, Rippen et al. (2013) identified five major facets of an organizational framework for providing a structure to organize and capture information on the implementation and use of health IT. The authors propose a new organizational framework for health IT implementation and use with five major facets: technology, use, environment, outcomes and temporality.

A systematic review of the health information technology research sponsored by the Office of the National Coordinator for Health IT (ONC) (Jones, Rudin, Perry, Shekelle, 2014) observed that very few studies report adequate information on implementation and context of use to determine why most health IT implementations are successful while some are not. They conclude that "it is no longer sufficient to ask whether health IT creates value; going forward, the most useful studies will help us understand ***how*** to realize value from health IT (Jones, 2014, p.52). They call for researchers to shift the focus ***from if to how*** by promoting research that empirically studies the mediating effects of contextual and implementation factors on the relationship between health IT and key healthcare outcomes. The lack of reporting about context and implementation details raises a question of whether these important factors are being ignored during implementation or if researchers are overlooking them or consider them unimportant.

Recent research viewing IT-associated organizational change through the lens of Affordance Actualization theory shows promise of providing new insight into ***how*** and ***why*** outcomes occur, rather than on

what outcomes occur and ***what*** the major barriers to those outcomes are (Strong, 2014). An affordance is defined as "what is offered, provided, or furnished to someone or something by an object" (which in our case would be an EHR system) (Volkof & Strong, 2013). Thus affordances can essentially be seen as potential benefits or value of using EHR systems. The theory shifts the view of EHR implementation as a single intervention to a greater focus on the dynamic process by which outcomes are achieved—in our view a systemic perspective. Instead of examining outcomes at a single level, it examines the multi-level dynamics of "actualization" (which in our view would be achieving the potential of health IT) focusing on how the organizational change process and outcomes emerge from individual actualization processes and their immediate concrete outcomes.

In conclusion, the growing body of research on EHR implementation identifies many variables associated with the implementation of electronic health record systems, but little evidence that may explain the wide variation in results achieved.

THEORETICAL FRAMEWORK

The theoretical framework for this study is systems theory. System theory provides a framework for examining the fit among technology, people, structure, and process and has been widely applied in examining organizational behavior across many settings, especially in the workplace. The applicability of systems theory to research in healthcare settings has been established by a number of researchers (Brailsford, 2012; Payton, 2011; Frank & Murray, 2000). The dictionary defines a system as *a set of interacting or interdependent components forming an integrated whole*. Mingers & White (2010) provide a useful summary of the way in which the systems approach is generally understood among system researchers:[1]

- Viewing the situation holistically, as opposed to reductionisticly, as a set of diverse interacting elements within an environment.
- Recognizing that the relationships or interactions between elements ***are more important*** than the elements themselves in determining the behavior of the system.
- Recognizing a hierarchy of levels of systems and the consequent ideas of properties emerging at different levels, and mutual causality both within and between levels.
- Accepting especially in social systems that people will act in accordance with different purposes or rationalities.

Phase Two of our research has focused more specifically on the systemic nature of IT-based innovation and change to gain greater insight into ***how*** context interacts with technology in impacting results. As the focus of IT implementation shifts to optimization (achieving the value from EHRs) and moves out of the domain of an IT project to the domain of clinical transformation, we might logically expect that process and context variables would become increasingly important in achieving healthcare improvement outcomes.

METHODOLOGY

This article addresses Phase Two of a multi-phase research project. The primary method for Phase One of the study was a systematic analysis and synthesis of published research, case studies, and other health IT implementation reports and innovation projects. The search process focused on identifying multifunctional health IT interventions using EHRs that encompassed at least some of the functionalities required under meaningful use. Fifty studies and cases were analyzed for the first phase. The objective for Phase One was to identify a robust sampling of implementation projects. Prior research shows that "Many of the same lessons were extracted from widely different care settings" (Ludwick, 2009, p24; Lluch, 2011, p.852). Searches of several IT and healthcare databases were conducted (PubMed, Google Scholar, AHRQ, HealthAffairs). Search strategies used terms such as health IT, health information technology, health informatics, health IT implementation, EHR implementation, CPOE implementation, Meaningful Use, clinical innovation, and similar terms.

The analysis focused on identifying people, technology, structure, and process variables associated with success or failure of health IT implementation and innovation projects. The first step was to compile a comprehensive listing of variables identified as incentives and barriers to adoption and use, including the presence or absence of factors commonly cited as best practices. The next step was to organize the different variables to eliminate redundancies due to variability in use of terminology. The refined list of variables was used to systematically study each research report or case study to analyze and catalog how the variables related to the reported results of the project. Most studies focused on only a subset of the total list of variables. Reported findings as well as the discussion, lessons learned and conclusions were used for this purpose. The final step was then to look for patterns or commonalities across the sample of reports and how they were associated with success and failure.

A similar process was used in at least three other systematic reviews we identified (Jones, 2014; Lau, 2012; Kashavjee, 2006). Overall, however, few research projects have approached evaluation of EHRs from a systemic framework. Many of these studies have focused more on user acceptance issues than on the value achieved from a healthcare outcomes perspective. Moreover, most research projects that have attempted to evaluate the effectiveness (i.e. value) of EHR implementation, have focused fairly narrowly on a specific set of factors. Findings related to context variables or other more systemic issues are often reported in relation to lessons learned rather than having been assessed as variables in the study.

Phase Two of the study has focused specifically on two strategies:

1. Analyzing the reported results of additional research projects and case studies published since 2012 to assess if more recent experience confirms, extends, or contradicts findings and conclusions of Phase One.
2. Reviewing related literature on the ten specific CSFs identified in Phase One, including health IT-related theories and models, in an attempt to gain further insight into how and why they impact the success or failure of EHR systems—and thus on the ultimate value achieved from the transition to electronic health records in terms of healthcare outcomes. Although we focused on the literature related to healthcare, this exploration took us outside of healthcare to look at achieving the value of IT in other settings as well.

The objective of Phase Two is to help ensure that we are looking at the right things and asking the right questions in subsequent, more empirical, phases of the study.

Definitions

For the purpose of this study, success is defined as targeted measurable improvements in healthcare outcomes established in advance for health IT projects. Both process and health outcomes were considered. Failure is defined as significantly falling short of targeted measurable improvements in healthcare outcomes, low buy-in among intended user population (under 60%) leading to only partial use of functionality and continuation of former (paper) practices, or reduction in project goals, or cancellation of project. This study did not make any distinctions between the terms EHR and EMR and used both terms interchangeably in selecting health IT implementations to evaluate. (Specific subsystems, such as e-prescribing and CPOE, are encompassed within our EMR/EHR definition) Studies in both hospital and multiple practice settings are included. Meaningful Use is defined in the broad sense under the intent of promoting the effective use of health IT to innovate and improve the delivery and outcomes of care. Although recognizing the specific measures used for reimbursement under the HITECH Act incentive programs, the use of the term here is much broader.

Research Questions

1. What factors have been associated in the literature with successful implementation of health information technology?
2. What factors have been associated in the literature with the failure of health information technology implementation?
3. What factors appear to be most common across all settings and projects?
4. How did contextual or implementation factors influence or mediate results of health IT implementations?
5. Are any interdependencies evident among variables?
6. Are any patterns evident in factors that differ between successful and unsuccessful implementation experiences?

FINDINGS

One of the challenges of the study analysis has been dealing with the sheer magnitude of variables associated in the literature with effectively implementing health IT in the complex healthcare environment. The major objective was to systematically analyze health IT implementation research and case studies from a multidisciplinary systems framework to determine if it is possible to identify a set of variables that are consistently associated with project success and, therefore, may be hypothesized to differentiate success from failure to achieve meaningful use of health IT.

Analysis of the selected health IT literature revealed ten factors that consistently emerged among innovative organizations reporting significant improvement in quality of care and patient outcomes. Findings from Phase Two of the study have substantially confirmed earlier findings, although some sources classify or describe them from somewhat different perspectives. Descriptions and labels for these ten factors have been refined based on the findings of our Phase Two research. Synthesizing the prior research revealed many overlaps and different perspectives on categorizing them, which suggest interdependencies among them. In addition, the continued exploration underscores the systemic nature

of large-scale organizational change (i.e., innovations and transformation). Thus, it may be more accurate to think about the factors more as "themes" or "components" of creating a culture of innovation as opposed to isolated factors that could singularly make or break a health IT project.

Realizing the Value of EHRs: What Differentiates Success From Failure?

Achieving meaningful use of health IT starts at "Go Live!" That appears to be one of the prevailing themes of organizations that achieve results and realize the value of health IT. However, the EHR implementation process itself is equally important in setting the stage for success. Even organizations that paid considerable attention to workflow (i.e. process) redesign as part of implementation saw it as just the beginning of their journey to value realization. In Phase 2, we have expanded upon the ten factors originally identified with success of health IT implementation. The expanded explanation puts more emphasis on the systemic nature of factors and ***how*** they influence success or failure.

Process Factors

1. Active CEO commitment (with a focus on shared vision, building buy-in, and creating a compelling case for change aligned with organizational mission). Visible leadership from the top was one of the most dominant factors associated with successful implementation of EHRs leading to improved outcomes. Top leadership at successful organizations seemed to have a keen sense of the importance of setting the stage for major change and how challenging it would be. They were especially adept at aligning organizational goals with technology goals and communicating the big picture of how and why the transition to electronic health records was essential for moving the organization forward in today's changing healthcare environment. They were often very adept not only at creating a sense of urgency for their own organizations to change, but tying it into the need for change on the national level as well in order to achieve the goals of improved care, greater access and lower cost. They effectively tied change initiatives to achievement of clinical improvement goals and why it was in everyone's self-interest to support the initiative, thus helping to build buy-in. Effective CEO's consistently reinforced their message and persevered when the going got rough. Importantly, they also seemed to understand the implications of changes for other aspects of hospital or practice management and acted accordingly, which proved important to eliminating barriers to change.
2. Patient-centered care and patient engagement. The most successful organizations appear to be leaders in moving to more patient-centered care (also referred to as process-centered care) models. The approach often encompasses the notion of putting patient safety first as well. Ultimately the success of patient engagement is determined by the quality of the interaction between patients and clinicians. It takes advantage of new tools, such as Web patient portals, shared patient records, e-consultation systems and online data access for patients, and increasingly mobile apps, home monitoring devices, and more. Two distinguishing factor appear to be a focus on two-way interaction rather than information push, and a more holistic versus episodic view of patient health with greater focus on continuity of care. Some innovators see it as a major paradigm shift from today's task-focused, provider centric institutions, which is leading to emergence of new models for care, usually based on a more integrated team approach to care. Underlying this approach is the viewpoint reflected by former IOH President Dr. Harvey Fineberg that healthcare is a tightly coupled,

complex system and key to improving quality is focusing on the design of the system not simply pushing individuals to work harder or smarter.

3. Quality focus with clinical benchmarks for monitoring success. The most successful organizations had clearly created a culture of quality that started at the top. Policies and benchmarks were aligned with their goals, with a top priority on clinical, health outcome goals, and also process improvement goals. It was often expressed in terms of putting patient safety first in the mission of the organization. Goals were collaboratively developed, explicitly defined, and widely shared. Goals were tracked regularly and transparently with clear benchmarks for success. Importantly, they were goals that mattered to clinicians and engendered wide-spread buy-in. Although not driven by cost-cutting, goals recognized the value and mutual interest in efficient, cost-effective care solutions.
4. Workflow (process) integration. The most successful organizations clearly viewed workflow redesign as an opportunity to improve continuity of patient care, gain efficiencies, and improve care outcomes. Indeed, workflow redesign was seen as key to achieving value from health IT systems for patients, providers, and the organization. Leadership for successful workflow redesign resided with physicians, nurses, and other providers with high involvement and buy-in of clinical staff. Projects were well planned, orchestrated, and resourced. Workflow redesign was an ongoing process that started with Go Live. It was also iterative; as clinicians gained experience with new systems, they gained new insight into opportunities for improving care delivery. As clinicians gained experience, innovations tended to became more integrated across former silos of care with more aggressive patient outcome goals.
5. Strong leadership of clinical professionals (physicians and nurses). Highly successful healthcare systems inevitably had strong, visible physician leaders who had a clear vision for the potential for electronic health information and exchange to transform care in positive ways. They were effective in working with their peers and enlisting their buy-in to change by helping them see the benefits longer term for themselves, their patients, and the institution. Strong nursing leadership also appeared to be vital. Nurses clearly had a perspective of the patient care workflow different, and in many ways more detailed, than physicians. Working relationships between physicians and nurses were critical to redesigning workflows. Role changes were often indicated, especially with a shift to more team-based care. Clinicians could be both strong enablers as well as strong barriers to change.
6. Engagement, Training, On-going Support. Clinician engagement on all levels was critical to success. Understanding of what was required of clinicians and why it was important could NOT be assumed. Training was cited in every case as critical to success. However the quality of the training and support was equally important. Training both initial and ongoing and incremental was critical for smooth transition to a paperless patient care system. Hands-on training immediately prior to Go Live as well as on-going training were both critical. Training needs differed among clinicians and at different stages of the process. An especially distinguishing feature among the success stories was that training was also viewed as a means of engaging staff members in implementation. Training provided one to one, just in time, 24/7 minimizes frustration, provides opportunities to educate about appropriate use, identifies corrections, and allows further improvements to minimize potential medication errors (First Consulting Group, 2006). Training was also viewed as an opportunity to reinforce best practices.

Contextual Factors

7. Supportive organizational climate for innovation. Successful organizations were able to create a climate or culture that was supportive of change and encouraged clinicians to try new ideas while realizing that not all ideas would prove to be effective. Transformation was approached more as an ongoing process rather than a project or series of projects. Recognizing that there are both technical and social aspects to technology implementation, successful organizations appear to be more sensitive to the opportunities from the viewpoint that the technology and the organization transform each other during the process. Even with a well-thought out plan, the process can actually take on a life of its own, and a system for flexibility is essential. Feedback, dialogue, interventions, and activities all play important roles; innovation is iterative. A culture of innovation appeared to be strongest when it cascaded from the top throughout the organization and clearly aligned with the mission of the institution.
8. Collaborative culture (teamness). Evidence suggests that participation and engagement are vital for the success of new technologies. Successful organizations tend to create a cooperative dynamic where end users solve technical problems, write templates, and teach each other about software features. Teamwork is a major pillar. Collaboration is a clear expectation. The value that seems to bring the various medical professional groups together for integration is a broad consensus about the importance of effective and efficient care. A collaborative approach is viewed as critical during design, development, implementation, and post-implementation phases (optimization). Most often the staff, not the physician, has the best knowledge of existing and optimized processes. Different members of the workforce bring different perspectives and skills; interdisciplinary approaches generally are viewed as most effective.
9. Systems perspective on change (holistic view). Success of EMR implementation and use depends on integrating the system into often complex organizational settings. "The ultimate value achievable from an investment in health IT is directly related to the breadth of integration it provides across all parts of the healthcare delivery system (Ajami& Bagheri-Tadi, 2013). Workflow redesign is critical because of the need for realignment to realize the value of technology investments and improve quality. Efforts generally affect patient--clinician relationships job roles, incentives, as well as workflows and clinical practice routines. It is more like building a new ship rather than just moving the deck chairs around. A systems perspective helps clarify interdependencies and points of interaction between what are often relative silos of operation. These are the points in the care system where patients tend to get "lost," errors occur as hand-offs are made, or bottlenecks occur. The most innovative organizations focused on improving coordination of care, which generally means better communication and coordination across different functions and care units and often present the best opportunities for streamlining processes, improving coordination of care, and reducing medical errors.

Technology Factors

10. Technology reliability, responsiveness and interoperability. Technology usability, reliability, responsiveness and interoperability repeatedly came up in the literature as key factors (Fellmeth, 2014). Successful organizations quickly moved beyond a focus on capturing accurate information to the value of sharing information across functions and institutions to improve continuity of care

and for decision support. Availability of local technical support was seen as critical. EHR technical design, performance and support reportedly affected its usage and user satisfaction. Other concerns related to reliability and security. The presentation of information in the EHR was identified as a major issue, especially when it did not map to workflow. This issue underscores the importance of the EHR (or other health IT) selection processes since there are many competing systems with varied interfaces and functionality. It was not possible to assess the extent to which lack of fit of EHR technology to practice needs might be attributed to general deficiencies in all EHR systems or whether it might be attributed to a failure to make a good choice of system for practice needs. Inadequate training is also sometimes misdiagnosed as technical problems when users are unaware or incorrectly use functionality. A lack of interoperability and information exchange infrastructure and associated costs are the most common barriers to information sharing among clinicians.

Table 3 shows the frequencies for each of the ten critical success factors for meaningful use. Not all articles, case studies, or reports necessarily identified all ten success factors. Some study reports were more comprehensive in reporting on the full scope of the implementation process whereas others were more focused on less comprehensive objectives. These factors came up consistently across different projects, but the terminology and frame of reference varied. For example, for the factor "Active CEO Commitment," here are some examples of how the importance and impact of the factor was reported in different studies. (Note these are brief statements; in most cases the discussion was more detailed.)

- Support of the policy making level is required for widespread health IT adoption beyond pilot stages (Lluch, 2011).
- Governance refers to senior management's activities or substantive personal interventions in the management of the EMR implementation. It is concerned with mission, vision and top management's behaviors related to pre-implementation, implementation, and post implementation of the EMR (Kashavjee, 2006).
- Successful implementations are supported by executives (Ludwick, 2008).
- Shared vision for care delivery starts with the end in mind (ONC, 2014).
- The work of relating and engaging with users is central to the successful implementation of any new technology and starts at the top levels (Mair, 2012).
- "Sense-making" is an important aspect of implementation. Sense making deals with having a shared view of its purpose, understanding how it will affect them personally, and grasp its potential benefits (Mair, 2012).
- Vision, support, and involvement starts with upper management (Metzger, 2003).
- CEO must be on board (Metzger, 2003)
- Mindset that CPOE (or any change) is the right thing to do, not focused primarily on ROI (Metzger, 2003).
- In every hospital, much effort was expended to convince physicians that CPOE was a necessary investment in patient safety and quality (First Consulting Group, 2006).
- Coordination of business and IS planning is successful only if mandated by top management (Lederer, 1989).
- Leadership recognizes that there will be bumps in the road and will be unwavering. Commitment equals resources, multi-year effort, not expecting immediate results (Metzger & Fortin, 2003).

Table 3. CSF For Meaningful Use: What Differentiates Success from Failure?

Critical Success Factors	Frequency of Citations
Active CEO Commitment (with a focus on mission, vision, building buy-in, and creating a compelling need for change)	37
Patient-Centered care and patient engagement	24
Quality focus with clinical benchmarks	30
Workflow (process) integration	33
Strong leadership of clinical professionals (physicians and nurses)	44
Engagement, training, ongoing support	32
Supportive organizational climate for innovation	18
Collaborative culture (teamness)	26
Systems perspective	38
Technology reliability, responsiveness, interoperability	28

CONCLUSION

This section addresses the six research questions addressed by the study. Table 1 and 2 underscored the complex process of implementing new health IT systems. With more than 100 factors identified in the research that are believed to influence implementation results, the two frameworks shown in Tables 1 and 2 help to clarify the many requirements for EHR implementation. However, not only have these frameworks failed to substantially improve results, neither do frameworks such as these answer the question of what differentiates success from failure for those organizations that follow them. Our study essentially asks: Out of everything that must be addressed for a successful health IT implementation, what are the critical success factors to ensure the organization achieves their clinical improvement targets? What do CEOs need to focus on to ensure they get it right? The research has identified 10 themes (CSFs) that consistently emerged from innovators that reported significant improvements in care goals and patient outcomes. The findings became the basis for classifying and describing ten critical success factors, only one of which relates directly to technology. The others are contextual and process factors. Moreover, the evidence points to multiple interdependencies among these variables, none of which have yet been empirically verified. It is not that all the myriad of factors are not important. It is more a matter of creating focus for top managers and project leaders to steer the ship.

A prevailing theme among successful organizations is a view of achieving value from health IT as a shared journey, aligning initiatives with organizational goals for clinical improvement and the institutional mission. Successful organizations tend to see challenges as opportunities rather than problems. The organizations developed a culture that encouraged innovation, supported change, and viewed failure as part of the learning process.

In addition, studying the issues from a systems framework provides insight into the complexity of clinical innovation. It shifts the perspective from viewing EHR implementation as a single event to looking at the dynamics of achieving value of EHRs as an iterative process that involves the interaction of technology, people, and process at both individual and organizational levels.

Research Limitations

Our search was limited to English language articles and cases published since 2000 (with a few exceptions). Emphasis was placed on the most recent studies because of the rapid advancement of EMR implementation in the past few years and to gain the viewpoint of medical practices that had some history of use. A structured analysis process was used to synthesize prior research. However, due to the nature of qualitative studies, it is difficult to entirely rule out biases in the analysis and interpretation of findings, and therefore may have limited generalizability. Although the research included international studies, the predominant focus was on the United States health care system, and cultural differences that might influence study findings are not specifically taken into consideration.

In addition, although not specifically documented in the study, the first author's many years of experience in implementing IT change in a variety of settings as well as knowledge of case studies, presentations at conferences, stories of innovation award winners by organizations such as HIMSS and *Health Informatics Magazine*, workshops, etc. also influenced and reinforced the conclusions from trends specifically identified through the structured analysis conducted in the study. Thus although as a researcher one might claim impartiality, it is hard to rule out bias in a qualitative study.

Implications for Practice and Future Research

The research has direct implications for clinical practice. It addresses important questions that should be of interest to every healthcare provider engaged in IT based initiatives to improve the delivery of care, which usually require a huge investment of resources. Given the large number of projects that fail to fully achieve the intended benefits from EHR implementation, identifying factors that could help improve the success rate of initiatives would have significant and widespread benefit.

The findings of this study suggest that technology is only one of ten (or possibly more) factors that interact systemically to affect the meaningful use of health information technology. Thus, when measuring or researching the impact of health information technology, it is critical to differentiate between issues, problems and results that truly can be attributed to technology versus those related to contextual issues. Putting the technology in place, training people to use it, and converting paper records to electronic is only a necessary but not sufficient step toward achieving the value of EHR systems. It is also probably the easiest part. It sets the stage and provides new tools. Gaining the insight into ***how and why*** EHR systems can be used to change the way care is delivered to increase quality, improve access, and reduce cost is a dynamic, iterative process that has implications for every aspect of healthcare operations, and thus can best be viewed systemically. Making the process and organizational changes takes hard work, commitment at all levels starting at the top, engaging the entire organization, and focusing on what is best for patients.

Beyond the immediate institutional impact, projects that fail to achieve anticipated results can have consequences for progress toward transforming healthcare on a national level. Failures that are misinterpreted as failures of technology rather than failures of implementation methods or other factors, especially when reported in the health IT literature, can be counterproductive and can influence decisions of policy makers or industry leaders.

For the authors, the study is intended as a foundation for further research. It is hoped that other researchers will also find the results useful as a foundation for future research to inform understanding of ***how*** health IT can create value in healthcare delivery and outcomes. It is hoped that the findings

will provide focus for more empirical research and comparative effectiveness studies of contextual and organizational factors critical to the success of health IT transformation projects. Analyzing individual factors is insufficient to fully understand the dynamic relationships that affect the ability to effectively use health IT to transform care. A holistic systems approach can help deepen our understanding in ways that can help improve the success rate in using health IT to innovate and improve healthcare practice and patient outcomes.

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ENDNOTE

[1] The first author is well versed in systems theory. However, an in-depth discussion is not within scope of this article primarily for space limitations. A large body of theory and practice is readily available to interested readers.

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Section 2
Finance

Chapter 5
Health Infrastructure and Economic Development in India

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ABSTRACT

The chapter examines different aspects of health care service facilities and health infrastructure available in India. Major health outcomes like Life expectancy at birth and infant mortality rate depend on available health facilities like hospitals, beds and health trained personnel. Life expectancy in India has increased and IMR declines over the years, except few states like Bihar, Jharkhand, Madhya Pradesh, Uttar Pradesh. India has achieved a considerable progress in providing health infrastructure and its access to health care services to the mass population. However, less developed states like Uttar Pradesh and Bihar need more attention to improve health infrastructure and distribution of health facilities. In this context, we also highlight the department of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy, abbreviated as AYUSH which is a Governmental body in India purposed with developing, education and research in Ayurveda, which mostly prevails in under-developed state like Bihar. Our empirical results provide the evidence of strong association between health infrastructure and economic development in India.

INTRODUCTION

Good health is a state of physical and mental wellbeing necessary to live a meaningful and productive life. Long healthy life is the basic aspiration of human development. Hence, health has become an important indicator of human development. It is true that a healthy person is an asset for himself and for the economy also. To achieve 'good health for all' the country should promote health care services, prevent diseases and help people to make their healthy choices. In a society, 'good health for all' ensures economic progress. Good health promotes efficiency in workforce, enhances their skills and aptitude

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and is necessary for high life expectancy. Good health is absence of disease and also it represents both physical and mental capability to enjoy life. Good health is achievable under the condition of deliverable effective health care services which is possible only if available good health infrastructures.

Health infrastructures are "the basic services or social capital of a country, or part of it, which make economic and social activities possible" structures that support public health, having both tangible and intangible aspects and existing inside and outside the government sector. Health infrastructure is an important indicator for understanding the health care policy and welfare mechanism in a country.

Health care is a social determinant which is influenced by social policies. To achieve good health for people, especially the poor and the under privileged, the Government of India has focused on improving primary health services and ready to provide more accessibility and affordable to the poor people. In last few decades, India has achieved considerable progress in providing access to health care services to the people. Recently, the health infrastructure of country has expanded manifold. Now, the question arises whether health infrastructure is sufficient and properly distributed in India. So, the basic research question is on distribution of health infrastructure in India.

1. Is this health infrastructure adequate in India?
2. How is it distributed across India?
3. How does it affect economic development in India?

Disparity in health exists in India because of uneven distribution of health infrastructure across Indian States. Now we examine the disparity in health infrastructure in India focusing on three major channels – a) Institution, b) Knowledge capacity and c) health care service. All these connect the issues of economic development – with special focus on India.

This study is organized as follows: next section provides a brief review of literature. After spell out of the objective of the study, Data and methodology section describe data and provide primary observations. Analysis section explains the results and finally this study concludes with remarks.

BRIEF REVIEW OF LITERATURE

Literature mainly highlights the relationship between human health capital and economic development, health care service and labour productivity, etc.; however, a few have focused on health infrastructure (and particularly its distribution) and development. Effective health care service truly depends on allocating or distributing proper health infrastructure.

Colgrove, Fried, Mary, Northridge and Rosner (2010) investigated the public health and infrastructure for the US economy in 21st-Century. They highlighted that health infrastructure is crucial for public health care and services. In this paper, they argued that schools of public health (SPHs) are also essential to the nation's health, security, and well-being.

Ademiluyi and Aluko-Arowolo (2009) studied the infrastructural distribution of healthcare services in Nigeria. They examine the biomedical or western orthodox health care with its expansive bureaucratic ethos within the concept of hospitals structure in Nigeria. They observed that distribution of medical care delivery in Nigeria is biased towards urban area. Medical care services are favoured to the urban population at the cost of rural settlers. Infrastructure distribution of health care in rural areas of Nigeria are neglected to satisfy the urban areas, where the educated, the rich and Government functionaries reside.

Banerjee, Duflo and Deaton (2004) examined health care delivery in Rajasthan, India. They observe that the quality of public service is extremely low. The supply of quality of health care serviceis scare and the gap is filled up by unqualified private service providers. These unqualified private providers account for the bulk of health care provision of rural Rajasthan. Banerjee, Duflo and Deaton (2004) conducted a survey at Udaipur district of Rajasthan. Udaipur is one of the poorest districts in India. Based on primary survey of Udaipur district, they observe that the low quality of public facilities has also had an adverse influence on the people's health. In such an environment where people's expectations of health care providers seem to be generally low. In this context, they suggest that the state has to take up the task of being the provider and regulator and that definitely improve the public health care services.

Laxmi and Sahoo (2013) examine the relation between health infrastructure and health indicators of Andhra Pradesh for the period of 1980-2010. They develop a health infrastructure index focusing on hospitals, nursing home, beds, doctors and government hospitals etc. They investigate health sensitivity in response of health infrastructure estimating its elasticity coefficient.

Bhandari and Dutta (2007) study the health infrastructure in rural India, focusing on family welfare, medical education, and control of drugs, prevention and control of major diseases. Bhandari and Dutta (2007) consider physical infrastructure in terms of considering health centers, dispensaries hospitals etc. This paper includes medical and trained staff in discussion on rural health infrastructure and identifies the critical gaps between requirement of infrastructure and services.

Patil, Somasundaram and Goyal (2002) examine the health scenario in rural India and observed regional and gender disparities. They find main reason of disparities in the available health infrastructure. About 75 percent of health infrastructure, medical trained staff and other health resources are concentrated in urban areas where only 27 percent to 29 percent people live. They suggest that a paradigm shift from biomedical model to a social cultural model which should bridge the gap and quality of life.

Majumder (2005) examined empirically the inter-linkage between infrastructure and regional development in India. Using Multidimensional approach and composite index the paper found a significant relation between infrastructural and development, which is different for regions at different stages of development. His findings also suggest that identification of specific requirements of different regions and infrastructural expansion are major requirement of balanced regional development.

In this context we also study several Human Development Reports (HDRs) (Human Development Report Hooghly 2011, Human Development Report Burdwan 2015), which mainly emphasis on improvement of health and education. The HDRs highlight health issues focusing on birth rate to death rate, child bearing motherhood to child care service, vector borne disease to HIV/AIDs etc. The HDRs cover three important indicators for examining the health status of the people - these are preventive health care indicator, curative health care indicator and promotional health care indicator. Index of Curative Health care facilities has been constructed using the indicator like (i)No. of Bed per 1000 Population, (ii)No. of Doctors per 1000 Population. Preventive Health care index has been constructed using indicators like (i) Percentage of Households having Latrine facility, (ii)Percentage of Households having Separate Bathroom, (iii)Percentage of Households having Safe Drinking Water facility. The Promotional Health care index has been constructed using indicators of (i) Percentage of Institutional delivery, (ii) Percentage of Mother facilitated with 3 times Ante-Natal Care (i.e. ANC-3), and (iii) percentage of immunized children. Using Principal Component method the reports have utilized the data driven weights for the construction of Curative health care index, Preventive health care index, and Promotional health care indices.

Sen, Iyer and Gorge (2002) consider the structural reforms and health equity in India, using NSS Survey data, 1986-87 and 1995-96. They find a gender inequality in health services particularly in untreated morbidity that is due to limited access to health services for the poor.

HEALTH INFRASTRUCTURE AND DEVELOPMENT

Human health is important for economic growth and development. Importance of health for socio-economic development has gained recognition in recent time. There is a strong relation between population, health and development. According to Banerjee, Duflo and Deaton (2004) better provision of health care is the key to improve health condition and also economic growth and development in poor countries like India. India's health challenges are not only huge in magnitude due to its large population but they are complex due to its diversity and the chronic poverty and inequality. There is little information available regarding the quality of health care delivery in developing countries. However, health care services are improving slowly with developing health infrastructure which is not properly recorded. Health infrastructure in the most of the developing economy is poor and so society need for the betterment of health service. Health care service providers could be either private or government; otherwise, jointly they can serve for betterment of the society. However, only the government can provide proportionately health infrastructure for whole population in poor country like India. Creation and distribution of health infrastructure is the first priority in a developing economy that it ensures good health.

IMPORTANCE OF HEALTH INFRASTRUCTURE IN INDIA

India is at the point of an exciting and challenging period in its history. India today enjoys as never before, a sophisticated arsenal of interventions, technologies and knowledge required for providing health care to her people. Yet the gaps in health outcomes continue to widen. On the face of it, much of the ill health, disease, premature death, and suffering we observed on such a large scale are needless, given the availability of effective and affordable interventions for prevention and treatment. Making healthcare affordable and accessible for all its citizens is one of the key focus areas of the country today. Health infrastructure is an important indicator to understand the health care delivery provisions and signify the investment and priority accorded to creating the infrastructure in a region.

OBJECTIVE OF THE STUDY

The main objective of this study is to examine at the provincial characteristic of distribution of health infrastructural facility in Indian States. This study investigates the disparity in health across India in three different areas, namely a) Institutional capacity building provision b) Skilled or trained personals c) Service providers. How are components of these health infrastructures distributed across states of India? This study examines state wise distribution of health infrastructure and availability of health care services in India.

DATA SOURCES AND METHODOLOGY

The present study is exclusively based on secondary data. For the analysis of health infrastructural distribution twenty-eight major states have been studied for interstate comparisons. Institutions are built up for creation of medical trained personals. The state wise numbers of Medical Colleges and MBBS Seats in India for the year 2015-2016 have been taken from Medical Council of India, AIIMS- All India Institute of Medical Science and Jawaharlal Institute of Postgraduate Medical Education and Research. The State wise data on Under Graduate Colleges and Post Graduate Colleges of AYUSH Hospital are collected from State Governments & concerned agencies of Government of India. This study broadly covers 25 state of India. The data for ANM and LHV Training School, (HFWTC) and Multipurpose Health Worker (M) Training Centre has been collected from Training Division, Ministry of Health & Family Welfare, Government of India. Similarly, the data for total number of Nursing Staff, Laboratory Technicians and Pharmacists at Public Health Centre and Community Health Centre of different states in India has been compiled from Rural Health Statistics 2014-15, Government of India. The statistics for Rural and Urban Hospitals, Beds are collected from Directorate General of State Health Services. Again the data of Licensed Blood Bank in India December was collected from Drug Controller General (I), Ministry of Health and Family Welfare, Govt. of India. Simple statistical tools are used in this study. Table and graph are used for presenting primary observation.

PRIMARY OBSERVATION

India has made a good progress in last few decades in health sector. Medical education infrastructures in the country have shown rapid growth in last 10 years. There are currently 420 medical colleges in the country that offer 56,838 MBBS seats between Government and private medical colleges. That makes India is the largest producer of doctors in the World. In comparison, the United States only produce 18,000 doctors a year. According to the Medical Council of India (MCI), the total number of registered doctors in the country is 936,488 and Auxiliary nurses' midwives are 756,937 & registered nurses are 1,673,338 as on December, 2014.There are 153,655 Sub Centres in a country which is the most peripheral institution. There are 25,308 Public Health Centres and 5396 Community Health Centres in India to provide integrated curative and preventive healthcare to the rural population.

INSTITUTIONS

Health infrastructures in terms of Government and private Colleges, ANM and LHV Training School, Health & Family Welfare Training Centre (HFWTC) and Multipurpose Health Worker (M) Training Centre, doctors, nurses, etc. have a major direct and positive contribution to health outcomes of any country.

INFRASTRUCTURE AVAILABLE FOR CREATING HEALTH SERVICES PROVIDERS

Table 1 provides state wise distribution of Medical Colleges and seats of MBBS in India in the current year. In terms of medical institution infrastructure the country has total 420 Government and private medical college with total admission of 56,838 during the year 2015-2016. The national distribution between Government and private colleges is almost 50 percent. Looking at the breakup across states, the states with more than 20 colleges are biased towards private entities. On the cheeky side, states that possess less than 20 colleges tend to be heavily biased towards the Government institutions.

From Table 1, it is clear that Tamil Nadu state has the highest number of Government medical Colleges (22) and the admission capacity is 2915 seats. Whereas in Maharashtra has the second highest number of Government medical colleges (21) with admission seat capacity is 2950 and Andhra Pradesh has 17 medical colleges with 2700 admission capacity. But the interesting think, private medical college is highest in Karnataka with 35 colleges having 5405 seats and Andhra Pradesh is holding second rank in number of private medical college having 30 with admission capacity of 4450 seats. On the other hand, states like Meghalaya and Goa have a few numbers of Government colleges, and seat capacity is also very low which are 50 and 150, respectively. From Table 1 it is clear that the North-Eastern reason (states like Assam, Jharkhand, Manipur, Meghalaya and Tripura) and Goa have no private medical colleges.

Apart from western medical system, Indian traditional AYUSH medical colleges and hospitals are also available and spread all over India (see Table 2). AYUSH is the ellipsis of the medical systems that are being practiced in India such as Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy.

Under the department of AYUSH, there are 488 under graduate colleges with admission of 26,406 in India. Looking at the Table 2, the state Maharashtra has the highest number 116 of UG colleges with admission capacity is also highest 7065 and Karnataka has second highest 76 number of UG colleges and UG admission volume is 3835. On the other hand, states that possess lesser UG colleges in Arunachal Pradesh, Himachal Pradesh tend to be one and two UG institutions and also admission capacity is 50 and 125 respectively. However under the AYUSH department there are 103 Post graduate colleges in India with 2366 admission capacity. Maharashtra state has more numbers of PG medical colleges with admission seat capacity is highest 835 and Karnataka has 22 PG medical colleges with 395 admission capacity. Most interesting think is state like Jharkhand and Goa has no PG medical college.

Table 1 and Table 2 display the distribution of medical infrastructure for capacity building of medical personals. The Southern Indian states have more medical colleges and hospitals compared to the rest of India, and least in the North-Eastern part of India. Thus, there is asymmetric distribution of capacity building medical infrastructure in India. Now we also examine the second layer of medical trained staff and nurses who provide services for pregnant women in different stages of their child bearing period and care for new born child under different schemes like popular family welfare programme (see Table 3 and Table 4).

The health status of the people is judged by examining certain health indicators such as preventive and promotional health care services. There are several parameters are judged for preventive and promotional health care and construct simple index for curative health care indicator and preventive health care indicator. Number of medical qualified doctors and number of Beds available for citizens are used to construct the Index of Curative Health care facilities. Whereas Percentage of Households having Latrine facility, Percentage of Households having Separate Bathroom, and Percentage of Households having Safe Drinking Water facility are used for constructing Preventive Health care index.The Promotional Health

Table 1. State wise details of medical colleges and MBBS seats in India for the year 2015-16 (as on 22.09.15)

	Government College		Private College	
State	**Number**	**Seats**	**Number**	**Seats**
Andhra Pradesh	17	2700	30	4450
Assam	6	726		
Bihar	9	950	4	400
Chhattisgarh	5	550	1	150
Goa	1	150		
Gujarat	11	1830	13	1400
Haryana	4	500	4	400
Himachal Pradesh	2	200	1	150
Jammu & Kashmir	3	400	1	100
Jharkhand	3	350		
Karnataka	15	1850	35	5405
Kerala	9	1250	21	2400
Madhya Pradesh	6	800	7	1050
Maharashtra	21	2950	27	3645
Manipur	2	200		
Meghalaya	1	50		
Orissa	3	550	5	600
Punjab	3	450	7	845
Rajasthan	8	1400	5	750
Sikkim			1	100
Tamil Nadu	22	2915	24	3300
Tripura	2	200		
Uttar Pradesh	15	1949	20	2600
Uttarakhand	2	200	2	300
West Bengal	14	2050	3	400
AIIMS*	7	673		
JIPMER*	1	150		
TOTAL	**200**	**27143**	**220**	**29695**

Source: Medical Council of India. * Outside the ambit of MCI.

care index has been constructed using indicators of Percentage of Institutional delivery, Percentage of Mother facilitated with 3 times Ante-Natal Care (i.e. ANC-3), and percentage of immunized children. For the construction of Curative health care index, Preventive health care index, and Promotional health care index. Ante-Natal Care (ANC) is the most important care service to the pregnant women. Table 3 and Table 4 display the state wise distribution of training schools for ANM and MPW, Family welfare trained staff and multipurpose health workers, respectively.

Table 2. State wise details of the Undergraduate Colleges and Post Graduate Colleges of AYUSH Hospital in India for the Year 2015

State Name	UG Colleges	UG Adm. Capacity	PG Colleges	PG Adm. Capacity
Andhra Pradesh	15	680	4	74
Arunachal Pradesh	1	50		
Assam	4	190	1	12
Bihar	30	1280	2	95
Chhattisgarh	8	470	1	17
Goa	2	90		
Gujarat	28	2060	5	151
Haryana	7	380		
Himachal Pradesh	2	125	1	24
Jammu & Kashmir	3	130	1	15
Jharkhand	3	140		
Karnataka	76	3835	22	395
Kerala	22	1050	6	118
Madhya Pradesh	42	2725	4	24
Maharashtra	116	7065	35	835
Odisha	12	340	2	30
Punjab	16	880	2	53
Rajasthan	16	927	3	120
Tamil Nadu	28	1231	4	156
Uttarakhand	6	310	1	14
Uttar Pradesh	35	1605	6	203
West Bengal	16	843	3	30

Source: Medical Council of India

Table 5 provides the state wise distribution of trained supporting health staff and population in India. Normalizing number of trained supporting health staff across India we find that top rank holding states are Arunachal Pradesh, Mizoram and Nagaland, and their trained supporting health workers are 35.412, 30.168 and 27.849 per one lakh population, respectively. However, these states have less training institutions. Bottom three rank holding states are Maharashtra, Uttar Pradesh and Bihar with staff of 5.359, 4.133 and 2.495 per one lakh population, respectively. Uttar Pradesh and Bihar are high density population states with less trained health personnel, so quality of health care service is also low and probably health inequality arises due to lack of trained health staff. South Indian states like Tamil Nadu, Karnataka, Kerala and Andhra Pradesh are more developed compare to North Indian States (like Uttar Pradesh, Bihar, Assam). Average NSDP of South Indian states is around 50,000 and that of North Indian states is near about 22,000. So, comparatively developed states belong to South and afford to build up and improve institutions while less developed States in North India unable to do so.

Table 3. Auxiliary Nurse Midwife (ANM) and Lady Health Assistant (LHV) Training School

State Name	ANM/HW[F]	LHV/HA[F]
Andhra Pradesh*	14	3
Arunachal Pradesh	1	1
Assam	18	1
Bihar	21	0
Chhattisgarh	13	0
Goa	1	0
Gujarat	26	4
Haryana	8	0
Himachal Pradesh	0	0
Jammu & Kashmir	12	0
Jharkhand	10	0
Karnataka	28	4
Kerala	9	2
Madhya Pradesh	32	2
Maharashtra	29	5
Manipur	3	0
Meghalaya	2	0
Mizoram	1	0
Nagaland	1	0
Odisha	16	1
Punjab	6	0
Rajasthan	27	0
Sikkim	1	0
Tamil Nadu	6	1
Tripura	2	0
Uttarakhand	5	0
Uttar Pradesh	40	4
West Bengal	18	1

Source: Training Division, Ministry of Health & Family Welfare, Govt. of India.

Notes: *Data includes Telangana State.

Table 4. Health and Family Welfare Training Centre (HFWTC) and Multipurpose Health Worker (M) Training Centre

State Name	HFWTC	MPW(M)
Andhra Pradesh*	4	10
Arunachal Pradesh	1	1
Assam	1	0
Bihar	3	0
Chhattisgarh	0	3
Goa	0	0
Gujarat	1	0
Haryana	1	2
Himachal Pradesh	0	0
Jammu & Kashmir	2	0
Jharkhand	1	0
Karnataka	4	1
Kerala	2	1
Madhya Pradesh	3	7
Maharashtra	7	7
Manipur	1	0
Meghalaya	1	0
Mizoram	0	1
Nagaland	0	0
Odisha	3	3
Punjab	1	3
Rajasthan		0
Sikkim	0	0
Tamil Nadu	3	12
Tripura	0	1
Uttarakhand	0	0
Uttar Pradesh	11	0
West Bengal	3	2

Source: Training Division, Ministry of Health & Family Welfare, Govt. of India.

Notes: *Data includes Telangana State.

HEALTH CARE SERVICE

Health care service can be measured in terms of different parameters like available hospitals and number of beds in rural and urban areas. Table 6 shows the state wise distribution of Government Hospitals and available beds per one lakh population in rural and urban areas in India. Jammu and Kashmir,

Table 5. State wise total trained health staff served per one lakh population in India

State	Total Trained Health Staff	Population	Available Trained Health Staff (Per Lakh Population)	Rank
Andhra Pradesh	6443	84580777	7.618	21
Arunachal Pradesh	490	1383727	35.412	1
Assam	5628	31205576	18.035	8
Bihar	2597	104099452	2.495	27
Chhattisgarh	3012	25545198	11.791	14
Goa	116	1458545	7.953	19
Gujarat	4985	60439692	8.248	18
Haryana	2630	25351462	10.374	17
Himachal Pradesh	1248	6864602	18.18	7
Jammu & Kashmir	2819	12541302	22.478	6
Jharkhand	1836	32988134	5.566	24
Karnataka	6991	61095297	11.443	16
Kerala	5436	33406061	16.272	11
Madhya Pradesh	5544	72626809	7.634	20
Maharashtra	6022	112374333	5.359	25
Manipur	675	2855794	23.636	4
Meghalaya	673	2966889	22.684	5
Mizoram	331	1097206	30.168	2
Nagaland	551	1978502	27.849	3
Odisha	3137	41974218	7.474	22
Punjab	3195	27743338	11.516	15
Rajasthan	11847	68548437	17.283	9
Sikkim	86	610577	14.085	13
Tamil Nadu	10189	72147030	14.123	12
Tripura	619	3673917	16.849	10
Uttar Pradesh	8258	199812341	4.133	26
Uttarakhand	713	10086292	7.069	23
West Bengal	8461	91276115	9.27	28

Source: Training Division, Ministry of Health & Family Welfare, Govt. of India.

Uttarakhand and Kerala are top three states having 15.4, 9.5 and 6.5 rural hospitals per one lakh rural population, respectively; and the least 0.33 hospital is available for rural population in Uttar Pradesh. Now, 289.5 and 270 beds are available per one lakh rural population in Goa and Mizoram, respectively. It should be noted that 5.69, 7.76 and 9.95 number of beds are available for one lakh rural people in Bihar, Chhattisgarh and Uttar Pradesh, respectively. Medical facilities are mostly available in urban areas. From Table 6 it is clear that Jammu and Kashmir, Himachal Pradesh, and Sikkim have 16.5, 7.7 and 5.9 urban hospitals per one lakh urban population, respectively. Jharkhand has the least 0.05 hospital per lakh urban population and second least is Madhya Pradesh. Sikkim, Himachal Pradesh and Meghalaya

are top three states having 846.5, 809.5 and 367.3 beds per lakh urban population, respectively; while Jharkhand has 6.7 beds per one lakh urban people.

Table 6 shows among the Indian States Percentage of per lakh rural population as well as urban population served by Govt. Hospital & Govt. Bed in Rural and Urban areas. This Table 6 displays the conditions of health service infrastructure in India.

There are 28 states in India among which Jammu & Kashmir served the highest 15.39 percentage of rural population in rural hospitals. From Table 6, the percentage of rural Population served per Government Hospital bed is highest in Goa with 289.453 and the percentage of urban Population served per Government Hospital is highest in Jammu & Kashmir. From the above table we find that Jammu & Kashmir served the highest percentage of population in rural and urban Government hospital among Indian States.

INFRASTRUCTURE IS CREATED FOR PROVIDING HEALTH SERVICES

As is shown in Table 6, there is large disparity in the healthcare infrastructure indicators across the Indian states when compared to the national average. Table 6 shows the comparison of different infrastructure indicators between India, with respect to its best performing state and a poorly performing state. Performance of health care service depends on the distribution of unit level health institution across India. Table 7 displays state wise distribution of health centre (normalized per lakh population) in India and the ranks of states in terms of number of available health centre per lakh. Top five rank holding states are Mizoram, Himachal Pradesh, Arunachal Pradesh, Tripura and Sikkim; and bottom five states are Bihar, Maharashtra, Haryana, Uttar Pradesh and Punjab.

Table 8 describes state wise AYUSH hospitals, Beds and dispensaries available for each ten lakh population in India. AYUSH systems are based on definite medical philosophies and represent a way of healthy living. The basic approach of all these systems on health, disease and treatment are holistic. Yoga has now become the icon of global health and many countries have started integrating it in their health care system. India has a rich heritage of medical wisdom derived from the Vedas that prevailed as Ayurveda. Under the department of AYUSH there are 3207 hospitals with 59783 beds in 28 states of India. Among all states, most of the hospitals are present in Uttar Pradesh having highest number of beds (i.e., 12416). There are 23373 dispensaries in all states and 776019 AYUSH practitioners registered, among them highest number of registered practitioners present in Bihar, whereas Bihar has only 26 AYUSH hospitals. AYUSH system is a substitute of the western medical system.

Table 1 to Table 8 describe the provision of health infrastructure for providing health care services in India. However, other health supporting staff such as nursing staff, laboratory technicians and pharmacists (see, Table 9) at different public health centers (see, Table 10).

Blood bank is also an important health infrastructure. Table 11 shows the available Blood Bank across India. Maximum Blood Bank is available in Tamil Nadu and minimum in Sikkim state, otherwise least Blood Bank is available in Dadra and Nagar Haveli.

Table 6. State wise government hospital and bed available in rural and urban areas in India (Per lakh population)

State	P.C. of Per Lakh Rural Hospital	P.C. of Bed Per Lakh Rural Population	P.C. of Per Lakh Urban Hospital	P.C. of Bed Per Lakh Urban Population
Andhra Pradesh	0.546	18.399	0.510	94.206
Arunachal Pradesh	4.876	121.910	4.726	118.159
Assam	4.059	27.993	1.114	133.612
Bihar	1.435	5.685	0.944	53.597
Chhattisgarh	2.122	7.762	3.722	176.833
Goa	3.081	289.453	1.764	188.683
Gujarat	0.865	28.607	0.342	69.850
Haryana	0.485	14.864	0.893	58.923
Himachal Pradesh	1.587	47.134	7.697	809.525
Jammu & Kashmir	15.393	37.637	16.515	113.304
Jharkhand	2.175	19.473	0.050	6.744
Karnataka	1.036	23.870	0.889	177.009
Kerala	6.496	100.709	0.904	125.642
Madhya Pradesh	0.635	19.065	0.468	81.163
Maharashtra	0.715	18.360	1.206	82.384
Manipur	1.138	36.109	0.839	83.558
Meghalaya	1.181	35.422	2.015	367.285
Mizoram	5.519	270.252	1.224	36.728
Nagaland	1.492	44.759	5.605	314.730
Odisha	4.744	20.300	1.299	136.843
Punjab	0.542	16.720	1.404	85.622
Rajasthan	5.144	63.976	2.868	79.956
Sikkim	5.252	56.893	5.860	846.475
Tamil Nadu	1.093	24.577	1.091	157.781
Tripura	0.774	46.452	2.184	240.781
Uttarakhand	9.464	53.233	0.951	138.358
Uttar Pradesh	0.332	9.947	0.778	91.997
West Bengal	2.046	31.647	1.011	201.110

Source: Authors Calculation

ANALYSIS

Now, we analyze these available data with basic statistical tools. We have selected some major variables for this analysis purpose. Figure 1 displays the matrix scatter diagram of major variables. Life expectancy at birth (LEB) and infant mortality rate (IMR) are strongly associated with number of trained health staff (THS) and number of hospital beds available per one lakh population.

Table 7. State wise health centre served per lakh population in India

State	Total Health Centre	Available Health Centre	Rank
Andhra Pradesh	14552	17.205	16
Arunachal Pradesh	455	32.882	3
Assam	5786	18.542	14
Bihar	11682	11.222	28
Chhattisgarh	6133	24.008	8
Goa	234	16.043	18
Gujarat	9630	15.933	19
Haryana	3139	12.382	26
Himachal Pradesh	2643	38.502	**2**
Jammu & Kashmir	2986	23.809	9
Jharkhand	4472	13.556	22
Karnataka	11823	19.352	12
Kerala	5624	16.835	17
Madhya Pradesh	10697	14.729	20
Maharashtra	12751	11.347	27
Manipur	523	18.314	15
Meghalaya	565	19.044	13
Mizoram	436	39.737	**1**
Nagaland	545	27.546	6
Odisha	8370	19.941	11
Punjab	3528	12.717	24
Rajasthan	17058	24.885	7
Sikkim	173	28.334	5
Tamil Nadu	10463	14.502	21
Tripura	1128	30.703	4
Uttar Pradesh	24791	12.407	25
Uttarakhand	2164	21.455	10
West Bengal	11613	12.723	23

Source: Authors Calculation

Table 8. State wise number of AYUSH Hospitals functioning in India as on 1-4-2014

State Name	Hospitals	Beds	Dispensaries	Registered Practitioners
Andhra Pradesh	0.236	13.2891	21.7307	362.6
Arunachal Pradesh	8.672	97.5626	45.5292	93.9492
Assam	0.128	6.56934	14.6128	53.0033
Bihar	0.250	22.3344	6.09033	1601.06
Chhattisgarh	0.548	36.4061	57.5842	100.958
Goa	1.371	99.4141	10.9698	588.257
Gujarat	1.109	48.5112	12.558	576.327
Haryana	0.394	31.3591	20.5905	1072.05
Himachal Pradesh	4.516	94.2516	165.487	1293.74
Jammu & Kashmir	0.319	28.3065	47.0446	358.894
Jharkhand	0.091	7.33597	6.24467	799.136
Karnataka	2.897	171.159	10.901	550.255
Kerala	4.849	160.21	43.1359	848.499
Madhya Pradesh	0.688	37.6032	22.3471	866.774
Maharashtra	0.934	85.5355	4.42272	1000.18
Manipur	5.953	85.0902	84.74	0
Meghalaya	3.708	37.0759	17.1897	84.9375
Mizoram	12.760	127.597	11.8483	0
Nagaland	1.011	5.05433	102.603	1009.35
Odisha	0.334	21.5132	31.8529	197.74
Punjab	0.721	60.3388	23.429	361.132
Rajasthan	1.926	19.0085	56.3251	463.176
Sikkim	1.638	16.378	8.18898	9.82677
Tamil Nadu	3.992	47.6943	8.649	415.485
Tripura	0.544	8.16567	36.4733	40.8284
Uttar Pradesh	9.969	62.1383	9.83423	502.131
Uttarakhand	0.991	37.3775	52.844	213.26
West Bengal	0.186	12.4786	20.1257	541.916

Source: State Governments and concerned agencies, all the figures are given after normalization for each ten lakh population

Figures 2 and 3 respectively show the relationship between NSDP and IMR, and NSDP and Life Expectancy in India during 2012-13. Infant mortality rate (IMR) is inversely related to income level (NSDP) while life expectancy at birth (LEB) is directly associated with NSDP that improves with economic development.

Table 12 demonstrates the pair wise Correlation among Life expectancy at birth, infant mortality outcomes and major health Infrastructure variables such as trained health staff, health centre, number

Table 9. State-wise nursing staff, laboratory technicians and pharmacists in India 2015

State Name	Nursing Staff	Laboratory Technicians	Pharmacists
Andhra Pradesh	2006	776	951
Arunachal Pradesh	319	74	97
Assam	3056	1225	1347
Bihar	1736	611	250
Chhattisgarh	1511	657	844
Goa	86	14	16
Gujarat	2705	1401	879
Haryana	1685	437	508
Himachal Pradesh	635	157	456
Jammu & Kashmir	1184	763	872
Jharkhand	1230	301	305
Karnataka	3176	1294	2521
Kerala	3969	365	1102
Madhya Pradesh	3629	892	1023
Maharashtra	2535	1387	2100
Manipur	433	96	146
Meghalaya	413	125	135
Mizoram	224	61	46
Nagaland	378	72	101
Odisha	1260	378	1499
Punjab	1907	482	806
Rajasthan	9250	1930	667
Sikkim	41	31	14
Tamil Nadu	7349	1314	1526
Telangana	1453	566	691
Tripura	421	67	131
Uttarakhand	456	157	100
Uttar Pradesh	4412	963	2883
West Bengal	7047	448	966

Source: Rural Health Statistics 2014-15

Table 10. State wise number of sub centre, public health centre and community health centres functioning in India as on 31st March, 2015

State/UT	Sub Centre	PHCs	CHCs
Andhra Pradesh	7659	1069	179
Arunachal Pradesh	286	117	52
Assam	4621	1014	151
Bihar	9729	1883	70
Chhattisgarh	5186	792	155
Goa	209	21	4
Gujarat	8063	1247	320
Haryana	2569	461	109
Himachal Pradesh	2065	500	78
Jammu & Kashmir	2265	637	84
Jharkhand	3957	327	188
Karnataka	9264	2353	206
Kerala[1]	4575	827	222
Madhya Pradesh	9192	1171	334
Maharashtra	10580	1811	360
Manipur##	421	85	17
Meghalaya	428	110	27
Mizoram	370	57	9
Nagaland	396	128	21
Odisha#	6688	1305	377
Punjab	2951	427	150
Rajasthan	14407	2083	568
Sikkim	147	24	2
Tamil Nadu	8706	1372	385
Telangana	4863	668	114
Tripura	1017	91	20
Uttarakhand	1848	257	59
Uttar Pradesh	20521	3497	773
West Bengal	10357	909	347

Source: Rural Health Statistics in India 2014-15

Note: # State informed that there are 79 other hospitals functioning which are equal to PHCs level facilities.

Table 11. State wise number of licensed blood bank in India till December 2015

State	Total No. of Blood Banks
Andhra Pradesh	140
Arunachal Pradesh	13
Assam	76
Bihar	84
Chandigarh	4
Chhattisgarh	49
Dadra and Nagar Haveli	1
Daman and Diu	2
Delhi (NCT)	72
Goa	5
Gujarat	136
Haryana	79
Himachal Pradesh	22
Jammu and Kashmir	31
Jharkhand	54
Karnataka	185
Kerala	172
Lakshadweep	1
Madhya Pradesh	144
Maharashtra	297
Manipur	5
Meghalaya	7
Mizoram	10
Nagaland	6
Odisha(Orissa)	91
Puducherry	18
Punjab	103
Rajasthan	102
Sikkim	3
Tamil Nadu	304
Telangana	151
Tripura	8
Uttar Pradesh	240
Uttarakhand	24
West Bengal	118

continued on next column

Table 11. Continued

Source: Drug Controller General (I), MOHFW

Figure 1. Matrix of scatter diagram of major variables

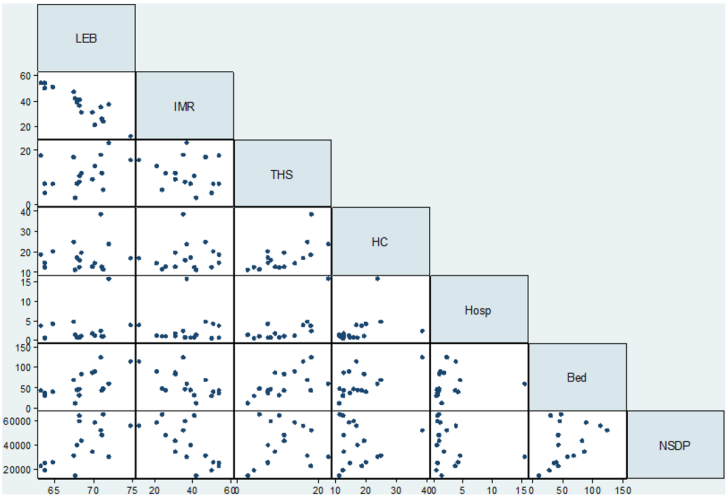


Figure 2. Relationship between NSDP and IMR

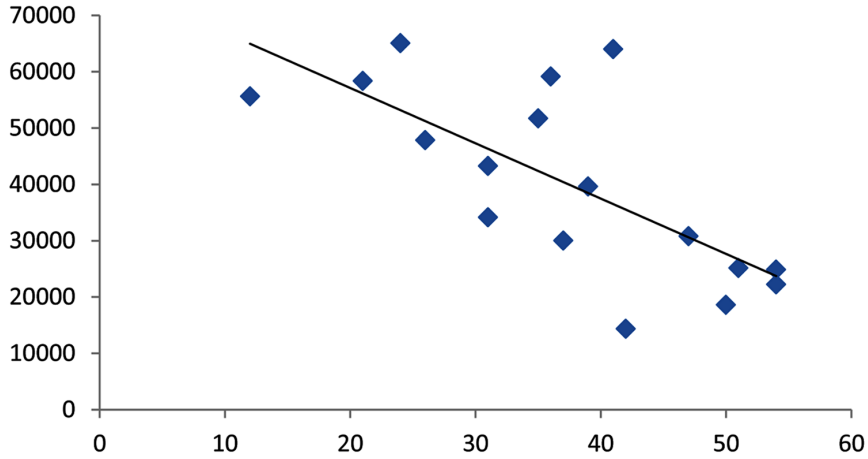
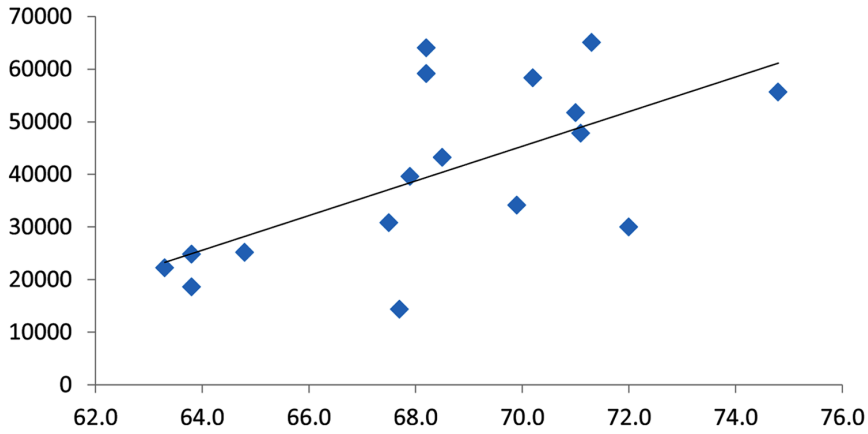


Figure 3. Relationship between NSDP and Life Expectancy at Birth



of hospitals and beds available per one lakh population, and per capita state domestic product (NSDP). Available beds per lakh population are significantly correlated with LEB, IMR, THS, HC and NSDP. NSDP are strongly correlated with life expectancy at birth and infant mortality rate. So, economic development is strongly associated with good health outcomes.

Life expectancy and IMR are crucial health outcome that depends on health infrastructure. Table 13 and Table 14 present the regression results of IMR and Life Expectancy at birth, respectively. Table 13 suggests that infant mortality rate declines with increasing available health facilities like health care centers and numbers of beds. IMR also reduces with increasing NSDP which is the indicator of economic development.

Table 14 suggests that life expectancy at birth increases with rising per capita income level (NSDP) and numbers of hospitals and beds. Trained health staff is not statistically significant in IMR and Life expectancy at birth. It is true that Life expectancy at birth and IMR are inversely related, however, both LEB and IMR improve with economic development in India.

Table 12. Pair wise correlation among major health outcomes and Infrastructure variables

	LER	IMR	THS	HC	Hosp	Bed	NSDP
LER	1						
IMR	-0.903***	1					
THS	0.374	-0.169	1				
HC	0.147	0.102	0.658***	1			
Hosp	0.263	0.044	0.663***	0.39	1		
Bed	0.609***	-0.59**	0.6**	0.59**	0.125	1	
NSDP	0.633***	-0.71***	0.134	-0.002	-0.24	0.417*	1

Note: '***', '**' and '*' denote the statistical level of significance at 1%, 5% and 10%, respectively.

Table 13. Regression of IMR on health infrastructure

Variables	Coefficients	t-Value
THS	0.5875	1.12
HC	0.9886***	3.07
Hosp	-1.21287	-1.89
Bed	-0.3255***	-4.26
NSDP	-0.00035***	-3.22
Constant	49.4725***	8.77
R^2	0.8331	
Adj.R^2	0.7572	
Root MSE	5.954	
F(5, 11)	10.98***	

Note: '***', and '**' denote the statistical level of significance at 1%, and 5%, respectively.

Table 14. Regression of LEB and health infrastructure

Variables	Coefficients	t-Value
THS	-0.20826	-1.24
HC	-0.123	-1.20
Hosp	0.57776**	2.82
Bed	0.06886**	2.82
NSDP	0.0001***	3.10
Constant	63.11567***	35.06
R^2	0.7591	
Adj.R^2	0.6496	
Root MSE	1.8993	
F(5, 11)	6.93***	

Note: '***',and '**' denote the statistical level of significance at 1%, and 5%, respectively.

Overall our findings suggest that improvement of health infrastructure and economic development certainly improve the quality of life in India

CONCLUSION

This chapter has reviewed the health infrastructure available in India and analyses the factors which are responsible for main health outcomes like Life expectancy at birth and infant mortality rate. LEB and IMR certainly depend on available health facilities like hospitals, beds and health personals and also on economic development. Life expectancy in India has increased and IMR declines over the years, except few states like Bihar, Jharkhand, Madhya Pradesh, Uttar Pradesh. The Government should focus more on health infrastructure of these states.

India has achieved a considerable progress in providing health infrastructure and its access to health care services to the mass population. In last two decades, in India, the health infrastructure has increased and improved in manifolds. Basic Health Care is necessary for all and India has achieved it too some extend. However, distribution of health infrastructure is not proper. Especially, Uttar Pradesh and Bihar are under developed compared to rest of India and they need more attention to improve health infrastructure and distribution of health facilities.

Economic development has strong feedback to improve infrastructure, more specifically health facilities that certainly improves human health capital, and later it helps to improve overall human capital.

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KEY TERMS AND DEFINITIONS

ANM and LHV Training School: Auxiliary Nurse Midwife health worker (Female) and Lady Health Assistant (Female) play vital role in Maternal & Child Health as well as in Family Welfare Service in the rural areas of India. It is therefore, crucial that the proper training to be given to them so that quality services be provided to the rural population.

AYUSH: The Ministry of AYUSH was formed with effect from 9th November 2014, is a Governmental body in India purposed with developing education and research In Ayurveda which is an Indian traditional medicine, Yoga, Naturopathy, Unani, Siddha, Homoeopathy and other alternative medicine systems.

Community Health Centre: Community Health Centres are being established and maintained by the State Government under Minimum Needs Programme (MNP) / Basic Minimum Service Programme (BMP). The Community Health Centres provide specialized medical care in the form of Surgeon, Physician, Gynecologist and Pediatrician supported by twenty-one paramedical and other staff. It has thirty in-door beds with OT, X-Ray, Labourroom and Laboratory facilities.

Health and Family Welfare Training Centre (HFWTC): In order to promote transparency and accountability in the working of every public authority and to empower the citizens to secure access to information under the control of each public authority, the Government of India has brought out an Act, namely, "The Right to Information Act, 2005", (RTI Act) which came into force on 15.6.2005. In accordance with the provisions of section 4(1)(b) of this Act, the Department of Health and Family Welfare, Government of India has brought out this manual for information and guidance of the stakeholders and the general public. The purpose of this manual is to inform the general public about this Department's organizational set-up, functions and duties of its officers and employees, records and documents available with the Department. This manual is aimed at the public in general and users of the services and provides information about the schemes, projects and programmes being implemented by the Department of Health and Family Welfare and the organizations under its administrative control.

IMR: Infant Mortality Rate (IMR) refers to the number of death per 1000 live birth in the first year of child's life. It measures the probability of a child during before attaining the age of one year. This is an important indicator of the quality of health services available to the people. The higher is the incidence of IMR poor is the level of health infrastructure and health care services and vice-versa.

Life Expectancy at Birth (LEB): Good health stands for a state of inclusive physical, mental and social wellbeing. Life expectancy at birth in that context works as the indicator of such state of health. It is a statistical measure of the average length of survival of human beings. Life expectancy of an individual

is the number of years the person is expected to live, given the prevailing age-specific mortality rates of the population to which he/she belongs. A large number of factors which include the general health status and hygiene, the status of maternal and child health, the extent of coverage of public health care delivery services available to the poorest of the poor, the incidence of morbidity and disease and so on are likely to affect the life expectancy at birth.

MBBS: MBBS full form is Bachelor of Medicine and Bachelor of Surgery. It is the official undergraduate degree awarded to students who graduate from medical schools or universities to enter the medical profession.

Multipurpose Health Worker (M) Training Centre: The concept of Multipurpose Health Workers (Male and Female) was introduced in 1974 for the delivery of preventive and promotional health care services to the community at the level of Sub-Health Centres (SHCs). The Multipurpose Health Worker (Male) is the grass root health functionary for the control of communicable diseases including Malaria, TB, Leprosy, Water Borne Diseases, as well as Environmental Sanitation, detection of disease outbreaks and their control, health education.

Public Health Centre: Primary Health Centres (PHC) is the contact point between village community and the medical officer. The PHC are established and maintained by the State Government under the Minimum Needs Programme (MNP) / Basic Minimum Service Programme (BMP). At present, a medical officer supported by fourteen paramedical and other staff is in charge of one PHC. It has four to six beds for in patients. It acts as a referral unit for six sub centres.

Sub Centre: The Sub Centre is the most essential and first contact point between the primary health care system and the community. One Auxiliary Nurse Midwife (ANM) and Lady Health worker manned every sub centre. One lady health worker is supervised of six sub centres. The sub centres are provided with basic drugs for taking care of essential health needs of men, women and children. In sub centre are provided promotive, preventive and curative primary health care service to the needed people.

Trained Health Staff: Nursing Staff, Laboratory Technicians and Pharmacists, etc., are considered, here, total trained health staff. This supporting staffs are essential in the health care service.

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Chapter 6
The Health Outcomes in Recession:
Preliminarily Findings for Greece

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ABSTRACT

The aim of the present study is to provide an overview of recent reforms in Greece as imposed by the fiscal adjustments. Potential harmful consequences of these vast healthcare reforms are also discussed, as a collateral victim of the recession, in which case the real "patient" is the overall healthcare system. Based on an extended review of the related literature, the economic crisis, currently numbering five years in Greece, was accompanied by vast healthcare reforms and significant cuts in spending. In particular, austerity measures implemented, impose that health expenditure should not exceed 6% as a share of GDP. Savings were expected to be accomplished through vast changes, including the redetermination of both pharmaceutical reimbursement and pricing, reduction of public servants and cost containment regarding payments to the private sector. So far, there is a significant rise in demand for public hospital services, following a significant drop for private providers, including maternity hospitals, dental offices and surgery clinics. At the same time, elevated prevalence of certain diseases is already reported, although many researchers dispute over a causal association between recession and these health outcomes. Conclusively, it can be argued that the financial crisis is a no easy way out, and the Greek healthcare system is challenged as both resources and demand are rapidly changing. What is yet to answer is whether these reforms, along with a co-existing rise in demand of health services, could jeopardize the quality of the system.

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INTRODUCTION

From the early 1980's countries of the European Union have ameliorated public health outcomes via improvement of living and working conditions as well as through the outstanding progress of medicine. Additionally, prevention policies and early diagnosis have contributed to improved health outcomes, significant longevity gains and reduction of premature mortality (Salomon et al., 2012). Life expectancy has reached an average of 80 years in 2009 across OECD countries (OECD, 2011). The vast majority of new health interventions are the result of new and innovative technologies applied in healthcare (Shah, 1991; Ball et al., 1985). These technologies have high costs, which in future will skyrocket, considering the increase of life expectancy, raising serious concerns on policy makers (Degaspari, 2013; Pauly, 2003; Beller, 2005). Worldwide, health care expenditure is rising, often in a faster ratio than economic or even population growth, resulting to an increasing share of GDP allocated to healthcare demands (OECD, 2011; Kelley, 2007; Reinhardt et al., 2002). Under this scope, long -term care expenditure as part of GDP could eventually double from 2005 to 2050. Even if governments adopted policies of cost containment, spending on health care and chronic disease will follow a similar trend due to the increased incidence (Colombo et. al., 2011). Many governments, in order to reduce their deficits, are obliged to undertake large fiscal adjustments and severe measures, such as decreasing the public spending concerning health, increasing taxes or increasing contributions to funds while at the same time cutting several social benefits, hardly bearable for the lower income population.

Amongst other countries struggling with austerity, Greece is currently going through the most significant economic crisis in its modern history, and, thus, public health budgets have significantly decreased in the context of public spending cuts. Short and long-term consequences of achieving the financial targets set by the European partners are analyzed, in terms of health outcomes and public health indicators.

BACKGROUND: GREEK HEALTHCARE SYSTEM BEFORE THE INTERNATIONAL MONETARY FUND

Healthcare system in Greece was mainly financed by the public sector (national budget and public funds), although the private sector was expanding. Total health spending reached about 10.6% of GDP in 2010 (World development indicators 2011, 2011). Although Greece was below the average in terms of per capita health expenditure, the mean annual growth rate of expenditure was 6.9%, which was much higher than the average OECD growth (4.0%). The main category of expenditure, which led to excessive increases in total health expenditure, was the pharmaceutical expenditure (2.5% of GDP), with growth in real per capita expenditure for 2000-2009 reaching 11.1% (WHO Global Health Expenditure Database., 2011). Some of the factors responsible for the pharmaceutical expenditure include the low penetration of off-patented drugs, the absence of electronic prescription system, the over prescription and an overall lack of a robust regulatory framework (Tsiantou et al., 2009; Falagas et al., 2007; Vandoros & Stargardt, 2013).

Concerning the allocation of resources, OECD data presented 21,000 physicians manning public health institutions, with a total of 72,000 doctors, when including doctors occupied in private clinics and private practices. While the number is apparently high (the largest of all the OECD countries), regional hospitals and health centers were understaffed. On the other hand, the number of nurses barely touched 3.3 per 1000 inhabitants, an extremely low percentage when compared to the OECD average (8.4%). Additionally, the number of beds in Greece was above the OECD average (4.1 /1,000 residents

in Greece compared to 3.5 /1,000 residents for the OECD in 2009, 35,000 beds in total). Over the years, the number of beds has decreased due to reduced days of hospitalization in hospitals, but also due to the increase in one-day surgery clinics (OECD, 2011). Even though, this leads to cost effective clinic policies, inadequate distribution of staff results in a misallocation of resources in the overall system and hence to defective services (OECD, 2011; Kounetas & Papathanassopoulos, 2013; Mitropoulos, P., Mitropoulos, I., & Sissouras, 2013). PHI (Private Health Insurance) coverage was rather low in Greece compared to other EU countries, while private expenditure, consisted mainly of out-of-pocket and under-the-table payments, and as a result of dissatisfaction for the public services provided (Economou, 2010; Siskou et al., 2009; Matsaganis, Mitrakos & Tsakloglou, 2009; Siskou et al., 2008; Liaropoulos & Tragakes, 1998).

The consequences of these problems dictated for years the need for radical restructuring of the public health system, both from the supply and the demand side (OECD, 2011; Economou, 2010; Souliotis & Lionis, 2005; Tountas, Stefannson, & Frissiras, 1995).

THE RECESSION

After more than a decade of economic growth and prosperity, Greece went into recession in 2008. In May 2010, the Greek deficit was estimated to be 13.6% while at the same time the debt was forecasted to hit 120% of GDP during 2010. Inevitably, a rescue package of a total €110 billion was agreed between the Greek Government, the other Eurozone countries and the IMF (International Monetary Fund). In this scope, a memorandum of understanding was signed between parties so as to secure the bailout deal (Melander &Harry, 2009).

At the same time, Greece was forced into taking several harsh austerity measures while the program of restructuring the economy was to be monitored and evaluated closely by the European Central Bank, the European Commission and the IMF. Austerity measures included cuts in health expenditure and a further restructuring of the healthcare sector, as feedback from the troika's evaluations was rather discouraging: alarming unemployment with particular concern on enormous youth unemployment, inefficient public sector with extended bureaucracy and the civil servant corruption, tax evasion, and low competitiveness (Kerin, 2010).

THE MEMORANDUM ERA

The third in a row memorandum of understanding (MOU) is the last of the agreements made between troika and the Greek government as well as a Medium Term Fiscal Strategy (MTFS) 2013-16, declaring that constant evaluation of all relevant fiscal indicators will be the key to readjusting monetary policies in every case where the bailout plan fails to bring the expected results.

The memorandum initially introduced a goal of cutting down health expenditure to below 6% as a percentage of GDP (IMF International Monetary Fund, 2012). The plan included 2 billion cut on pharmaceutical expenditure within a two-year horizon and a clear statement that unless the goals are reached, additional measures will be mandatory. By the end of 2010, a package of restructuring policies should have been implemented. Reforms included rebate collection, electronic prescription systems, full price list for drugs according to the established pricing policy, implementation of negative/ positive lists of drugs updated every trimester, detailed monthly data on hospital activity and expenditures, prescription

profile reports for doctors, internal price reference system, €5 charge for outpatient clinic visits which should also be applied for unnecessary visits to the emergency rooms (Commission., E., 2011).

What the national budget for 2013 includes for health expenditures, implied by the third memorandum of MTFS and the Medium Term Fiscal Strategy for the years 2013-16, was even greater cuts on hospitals' operating costs and pharmaceutical expenditures. What is expected for the current year is that the pharmaceutical expenditure does not exceed 2.62 billion, while operating costs should be reduced from €2.65 to €2.35 billion, for the same year (Hellenic Republic, 2011). Even though, hospital expenses have already met an important downturn, there is still need for the implementation of further reforms like a central supply system, a new framework regulating drug pricing and reimbursement and, of course, further salary cuts (Polyzos et al., 2013). Additional restructuring, including hospital and clinic mergers, is expected to bring a surplus of €360 million for hospital budgets. Under this scope, scale economies are aimed through administrative mergers, whereas further savings are attempted by substitution of generic drugs and services by community-based health centers, electronic management of budgets and integration of supplies.

Reforms also included e-health interventions under the scope functional reforms. ICT solutions and e-health could lead to sustainable solutions for the community but also facilitate a better interconnection of health services. Interoperable services introduced so far, as the establishment of a nationwide online platform for prescribing drugs, are still struggling to overcome initial implementation obstacles (Andreassen et al., 2007). In the field of e-Health, the Ministry of Health and Social Solidarity, in June 2006, introduced the e-health Roadmap. The e-health Roadmap was formulated to set out priorities and describe the strategy and an action plan organized for that purpose. Special attention was given to the Quality and Safety of health services provided. Thus, as primary operational reform is the establishment of a National Health Information System (NHIS), while in second place the IASYS plays the role as the central infrastructure of NHIS. The infrastructure aims to implement a national information database, to provide both health professionals and stakeholders with all necessary records (Angelidis et al., 2010). As far as the national fund is concerned, merging the four largest insurance schemes and €1 billion in cuts already implemented are expected to be evaluated in terms of efficacy in savings. The enforcement of the Fund's bargaining power to collect fees and the introduction of general practitioners in order to regulate hospital admissions could be achieved by the budget of 2013 states.

Private health providers consisting mainly of diagnostic laboratories, general hospitals and birth clinics have greatly expanded during the last decade, providing high-quality services both in terms of private expenditure as well as in terms of outsourcing, providing services to the public's fund insurers. Given the fact that a major part of the revenues are coming from national funding, the economic turmoil has considerably affected private providers that face nowadays decrease of their profits, inability to collect public debts, poor allocation of resources and, therefore, the obvious need for dismissals. What initially led to the growth, with a market share that increased annually by 12.8% was undoubtfully the fact that quality of services provided was greatly appreciated by the insured (Rachiotis et al., 2014; Telloglou & Kakaounaki, 2011).

Inevitably, the inability of covering employee expenses, as a consequence of severe cuts, results in the shrinkage of the industry. Metaphorically, the "Greek paradox" implies the existence of an oversized private health industry, while, at the same time, health services were "universally" provided as a public good which is a result of poor customer satisfaction. The long waiting lists, the understaffed clinics and the fact that every insured citizen could alternatively use the private sector services led the two providers at a supplementary role. It, therefore, looks like as the state-funded private sector used to play a great

role in substituting public health services, in the present time is sacrificed by bad governmental decisions (Liaropoulos, L & E. Tragakes, E., 1998).

What is more alarming is that private health insurance plans represent only a small part of the expenditure, making it impossible for the private sector to keep its profits without the governmental contribution. The economic turbulence has resulted in a great 25–30% decline in admissions to private hospitals (Kentikelenis et al., 2011), leading private providers to significant losses which can no longer support their employers. The unemployment rate of 57.8%, recorded among young people in the age group of 15-24 years, shows no evidence that private expenditure will be able to support revenues.

THE HEALTH STATE OF GREEKS BEFORE AND AFTER ECONOMIC CRISIS

Life expectancy rose more than six years from 1980 onwards, reaching an average of 78 years of life for the citizens of the 27 EU Member Countries (74.3 years for males and 80.8 years for females). The range of lower and upper age limits in life expectancy is eight years for the women and 14 years for men. Life expectancy for Greece was estimated 80.3 years for 2009, almost a year higher than the average OECD, yet not one of the highest when comparing similar EU countries like Italy and Spain. What is more, infant mortality was significantly low (3.1 deaths in every 1000 births for the same year). During 2005-2007, the life expectancy for healthy individuals was found to be for females 61.3 and 60.1 for males (OECD, 2011). Concerning risk factors associated with chronic disease development, thus costs, smoking remains a leading cause of premature death in the country, as Greece has failed to present a significant reduction in tobacco consumption. For instance, despite the fact that anti-tobacco laws were implemented, and campaigns were largely adopted, Greeks are on top of the list concerning smokers amongst OECD countries, with 39.7% of active smokers for the total number of juveniles in 2009 (OECD, 2011).

What is also alarming is an increase in obesity rates concerning earlier years. According to OECD data for 2009, 18.1% of Greek adults are obese. The region- specific published studies indicate that overall prevalence of obesity for Thessaly was 26.6%, and prevalence of overweight of the studied sample was 39.4% (Koukoulis et al., 2010).

Furthermore, what is also concerning is one more indicator: almost one-in-three children are affected by excess body weight. Only the fact such a significant proportion of the population was categorised as obese, raises high concerns for a subsequent increase of related diseases, such as diabetes and coronary disease, in the years to come.

At the same time, crisis seems already to have adverse effects on the health status of the Greek population. Unemployment increased job insecurity and inability to cover basic needs and increased psychological distress and associated illnesses (Pelzer, Schaffrath, & Vernaleken, 2014; Catalano, 1991).

Suicides are reported to be increased for the crisis period, suggesting a link between suicidality and the economic crisis (Kentikelenis et al., 2011; Economou et al., 2011; Stuckler et al., 2011).

On the other hand, some scientists claim that there is not enough data available yet to attribute causal association between the recession and these deaths. Thus, it is premature to conclude the correlation (Fountoulakis et al., 2013; Fountoulakis et al., 2013; Fountoulakis et al., 2013).

Evidence available at the moment shows that there is a significant increase in one month prevalence rate of major depression for 2011 (Economou et al.,2013), which should be alarming and that resulted in suicide rises due to a significant decline in employment (Stuckler et al., 2012).

Concerning the prevalence of specific diseases, the economic crisis seems to affect infectious diseases (Bonovas & Nikolopoulos, 2012). HIV new infections for 2011 showed a significant rise, mostly attributed to infections between heroin users, a sub-group that presented an enormous 15-fold rise of new infections in the first few months of 2011 (Paraskevis et al., 2011; Paraskevis et al., 2013).

Additionally, Greece ranked fourth among 30 European countries in terms of mortality caused by the novel A(H1N1) influenza virus that spread all over the world in 2009 (Nikolopoulos, Bagos, Lytras, Bonovas, 2011). Moreover, the West Nile virus spread in 2010, and 2011 (Danis et al., 2011(a); Danis et al., 2011(b)), and the several new cases of autochthonous Plasmodium vivax infection reported in particular regions of the country that had eradicated malaria since 1974 (Danis et al., 2013), raise serious concerns on the efficacy of preventive policies and constitute a great challenge for the years to come.

What could also potentially prove harmful for public health outcomes are the individually reported cases of "unmet care." A recent study of 26,486 respondents compared the reports of people claiming not visiting a doctor even though they felt it was necessary to do so. Comparing the results of 2009 with answers given in 2007 (before the crisis) the increase is significant. What people claim as the main reason they did not seek for care, is the long waiting times, travel distance and waiting to feel better (Kentikelenis et al., 2011).

CONCLUSION

Economic constraints, in order to hold public spending and reduce deficits, include cuts in health expenditure although the demand seems adversely to increase, since private expenditure is limited due to salary cuts. However, the main determinants of health expenditure will continue to be the national income, rapid technological changes and the population growth.

The economic crisis can cause dramatic social consequences, given that large part of the population is condemned to poverty. In the middle of economic turmoil, unemployment rises and social services are facing a demand increase with a parallel decrease in revenues. The most affected by the economic crisis are the middle or low-income classes, resulting in unmet care. In a period when the social and welfare system faces significant budget cuts, it is vital that a minimum framework of healthcare services be available and accessible for the less privileged. Moreover, decision analysis on the establishment of cost containment policies should probably include the cost of illness methods, based on the fact that such options raise concern on unemployment rises.

In a country like Greece that faces not only inadequate funding of health services, but also a misallocation of resources, there is a great danger that the quality is not maintained. As a result, preventive interventions and epidemiological monitoring are vital. Also, in the field of the outbreaks caused by infectious diseases, the need of targeted and rapid management is required. Even if prevention policies can bring high cost when applied, the long-term cost gains can be proven significant. Moreover, financial aid from other countries is anticipated as the ineffective surveillance could be harmful to public health of other nations, through transmission.

What technological advances have also offered to modern healthcare environment is a great variety of management and operational tools, from electronic health records to telecare systems. While these technologies have different implementation backgrounds, what they all offer as a competitive advantage is a promising era of efficiency and an opportunity to better contain medical costs. These technologies could obviously present a great opportunity in Greece's main organizational problem, the great frag-

mentation of healthcare system. So far, many of these technologies constitute part of the restructuring efforts, including electronic prescription systems and electronic auditing concerning drug reimbursement. What is yet to notify, in order to fully incorporate these tools, is that systems are fully integrated. Under the circumstances, the initial cost of acquisition and installation could prove not only a cost-effective policy, but also a cost-saving opportunity, essential for the Greek Healthcare System, more than ever.

The private sector, playing a serious complementary role in producing health services, was greatly affected, as private expenditure, initially 40-45% of the total finance, was diminished as a consequence of salary cuts. As a result, while the public sector is unable to meet the demand, private providers have to readjust their strategies due to underutilized capacity. What is mostly proposed as a potentially co-operative solution is the exploitation of the comparative advantage of both providers. The reallocation of resources and the economic readjustment raises the need to adopt evidence-based and personalized health policies with particular emphasis on prevention.

Since findings are still preliminary and scientific evidence is often conflicting, a biased misinterpretation could be potentially harmful. Linkages between health outcomes and the economic crisis are more likely to be adequately documented in the years to come, when all necessary long-term data are available. For the time being, it is crucial that all new information be closely monitored and assessed, since many of the preliminary findings are alarming, and signs that health outcomes have worsened in vulnerable populations should be taken into careful consideration.

As the recession deepens, more people are likely to be marginalized and are expected to seek for a protection social welfare net. The consequences from the social deterioration are not only health related. Thus, investing in health can prove cost-effective, but could also play a determinant role for growth. Healthy nations are more likely to overcome obstacles and recover their losses, whereas production can be challenged when public health is threatened.

In other words, what the recession has made to the overall finance and business sector, this will eventually be followed by a development era of opportunities and economic growth. What is not sure is that health outcomes will follow the same rates of development as in economic cycles. Health indicators may not have an equally rapid recovery and thus public health may be the real "chronic patient."

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Chapter 7
The Impact of the New Rural Cooperative Medical Scheme on Township Hospitals' Utilization and Income Structure in Weifang Prefecture, China

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ABSTRACT

The New Rural Cooperative Medical Scheme was gradually introduced from 2003 in China. This paper is based on a representative survey of 24 randomly selected township hospitals in Weifang prefecture over the period 2000-2008. Using a generalized form of differences-in-differences model, it aims to assess the effect of the reform on the utilization and income structure of the township hospitals. The estimations provide three main results linked to the effects of the New Rural Cooperative Medical Scheme on the behavior of the key stakeholders (households, health care providers and Health Bureau). Firstly, the reform had positive impacts on the utilization of township hospitals, particularly on the inpatient activity, but no significant impact on their income structure. Secondly, a decrease in the burden of hospitalization costs for households is suggested by the higher positive impact of the reform on the volume of inpatients in poor areas than in the other ones. Lastly, the marginal impact of the reform decreases over time.

1. INTRODUCTION

Since the beginning of the 21st century, China has been committed to ambitious social reforms directed mainly towards its rural population. The New Rural Cooperative Medical Scheme – a community-based health insurance scheme – which reformed the rural health insurance system covering less than 10% of

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the rural population at the beginning of the 2000's, constitutes one of the pillars of this action (for more details, please see Eggleston et al., 2008; Wagstaff et al., 2009a; Yip & Hsiao, 2008). One major objective of the implementation and scaling up of the New Rural Cooperative Medical Scheme was to increase the utilization of health services and more specifically of township hospitals – the largest health care providers (outpatient and inpatient care) at the primary level of the Chinese health care system. Another objective was to reduce health costs which had risen to very high levels this was partly caused by the over-prescription of drugs. The sale of medicines was more profitable for hospitals than the delivery of those medical services not associated with high-tech diagnosis. Therefore, hospitals tended to over-prescribe drugs. A half of health spending in China was dedicated to drugs spending in 2007 (Sun et al., 2008). Big efforts have been made to change the behavior of health care providers, to control drugs and service prices through the insurance scheme and the setting of a reimbursement ceiling. With the insurance reform, we can expect both 1) an increase of the medical activity and 2) that outpatient and inpatient services become more profitable than the sales of medicine, resulting on declining share of them in hospital income.

Considering the importance and the stakes of the reform, many studies have shown interest in the performance of the New Rural Cooperative Medical Scheme and in the enrollment and satisfaction determinants of individuals with regard to this scheme (Liu et al., 2008; Wagstaff et al., 2009a; Wang et al., 2006; Wang et al., 2008). Estimates have being made of the effect of the reform – implementation and reimbursement modalities – on demand access, utilization, financial protection, financing and efficiency of health services (Audibert et al., 2013; Barbiaz et al., 2010; Brown & Theoharides, 2009; Hou et al., 2014; Hu et al., 2012; Lei & Li, 2009; Sun et al., 2009; Yip & Hsiao, 2009). Results highlighted are mixed due to the multiplicity of the schemes' modalities and contexts (Brown et al., 2008; Feng & Song, 2009) related to the existing differences between Chinese regions and the management of the New Rural Cooperative Medical Scheme by the local authorities (Hou & Li, 2011). Such heterogeneity of the impact of community-based health insurance is also reviewed in different countries by Diaz et al. (2013). Dror's publications study also the effect of community-based health insurance, but with emphasize on the demand-side, on the insured: enrolment factors, equity of financial access, etc. He also shows important disparities of the effect of reform according to context. Overall, the literature, on China or others countries, mainly focuses on demand-side effect of the community-based health insurance.

Globally, results show that throughout China, the reform increased the utilization of health services at all health facility levels (village health stations: Barbiaz et al., 2010; township hospitals and county hospitals: Wagstaff et al., 2009a). Nevertheless, the effects are not homogeneous with regard to the health facility levels and the medical services considered: the New Rural Cooperative Medical Scheme appears to positively affect the number of outpatient visits at village health stations (Barbiaz et al., 2010) and county hospital level, but the effect is less clear at township hospitals level (Wagstaff et al., 2009a). The New Rural Cooperative Medical Scheme seems also to have a positive effect on the income of village health stations (Barbiaz et al., 2010) and township hospitals (Wasgtaff et al., 2009a), but does not affect the composition of their income (Barbiaz et al., 2010).

Therefore, more case studies are necessary to assess the specific effects of reform in a given context and thus improve our knowledge about the local and singular effects of its implementation regarding the behavior and the responses of the households and heath care providers (demand and supply sides). The need to take into account regional heterogeneity when findings are interpreted in a more general context is a point particularly made by You & Kobayashi (2009) in their review of the New Rural Cooperative

Medical Scheme studies. Eggleston et al. (2008) also highlight the need for micro-level data to deepen the analysis of health services delivery in China in connection with health insurance reform.

With this in mind, our study aims to fill the gaps of the literature: we focus on supply-side, at the township hospital level, and designed the study as a case-study, focusing on the Weifang city-prefecture (Shandong province). Exploiting longitudinal data and the gradual implementation of the reform (Table 1), we aim to estimate the effect of the New Rural Cooperative Medical Scheme on the utilization and the income structure of township hospitals. It should be expected that the insurance reform in the Weifang prefecture increases activity of township hospitals by changing the behavior of individuals (more demand) and modifies township hospitals' income structure, by decreasing the share of selling drugs (and over-prescription) and increasing that of medical revenue in their total income.

Table 1. Phasing-in of the new rural cooperative medical scheme

County	Township	2003	2004	2005	2006	2007	2008
Anqui (2003)	Jin Zhongzi					X	X
	Guan Gong Zhen				X	X	X
	Jingshi				X	X	X
	Lin Wu				X	X	X
	Wu Shan Zhen				X	X	X
	Xin An				X	X	X
	Zhe Shan Zhen				X	X	X
Changyi (2004)	Liu Tan					X	X
	Xia Dian Zhen				X	X	X
Gaomi (2005)	Cai Gou Zhen				X	X	X
	Da Mou Jia Zhen			X	X	X	X
	Jing Gou Zhen			X	X	X	X
	Kan Jia Zhen			X	X	X	X
Qinzhou (2003)	Dong Xia Zhen	X	X	X	X	X	X
	Gao Liu Zhen				X	X	X
	He Guan Zhen				X	X	X
	Shao Zhuang Zhen			X	X	X	X
	Tan Fang Zhen			X	X	X	X
	Wang Fen Zhen			X	X	X	X
Shouguang (2004)	Dao Tian Zhen		X	X	X	X	X
	Hou Zhen		X	X	X	X	X
	Tian Liu Zhen				X	X	X
Zhucheng (2004)	Bai Chi He			X	X	X	X
	Ma Zhuang Zhen				X	X	X

Source: Authors' database.

Note: The entry date of a county into the reform is in the parentheses. In our sample, not all the townships entered the reform at the same date as the county to which they belong. Before 2003, no counties or townships were involved in the New Rural Cooperative Medical Scheme. Fields are colored in grey when a township is covered by the New Rural Cooperative Medical Scheme. The cross indicates that at least 90% of the township population has subscribed to the New Rural Cooperative Medical Scheme.

The remainder of the paper is organized as follows. Section 2 presents the data and the methodology. Results are examined and discussed in Section 3. Section 4 concludes.

2. METHODS

We used a representative sample of 24 randomly selected township hospitals in Weifang prefecture (14% of all the township hospitals) observed annually over a 9 year period, from 2000 to 2008. The dataset was built from a survey conducted during the third quarter of 2009 in collaboration with the Weifang Medical University and the Weifang Health Bureau. Information was collected from the Weifang Health Bureau database and from the registers of each township hospital, and was checked and completed with interviews. Table 2 presents the descriptive statistics of the main variables.

Quasi-experimental approach is needed as the reform was not randomly assigned. Propensity score matching or double-difference are two methods which allow to estimate the effect of the reform in such circumstances. As the decision rule which guided the order of implementation of the reform is unknown, as the reform was gradually implemented and as our sample size is limited, we used the generalization of the double-difference method. The main advantage is that it does not require prior information on the decision rule. In fact, this method allows to use the THs where the NRCMS is not yet implemented as a comparison group for the THs where the NRCMS is implemented, i.e. the treatment group. In such way, the comparison group evolves alongside the implementation of the NRCMS, allowing to capture

Table 2. Descriptive statistics

Variables[a]	Total Sample (2000 – 2008)		Year 2000		Year 2003		Year 2006		Year 2008	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Number of households (10,000)	1.36	0.68	1.09	0.54	1.26	0.61	1.30	0.62	1.79	0.83
Share of rural (%)	92.80	4.38	93.46	3.98	93.56	4.17	91.86	4.69	92.57	4.46
Rural net income per capita	0.45	0.12	0.33	0.05	0.38	0.06	0.49	0.61	0.63	0.09
Number of beds	38.67	19.48	32.79	12.31	33.58	15.16	37.46	16.28	58.88	34.17
Number of professionals	38.95	28.80	34.78	23.69	36.25	26.56	38.54	29.00	52.12	40.39
Number of outpatient visits	30,196.21	24,882.01	25,395.26	21,332.54	25,350.04	21,182.67	29,269.83	21,423.32	48,244.58	32,582.50
No. of inpatients	1,271.42	892.17	958.87	642.79	912.29	712.21	1,476.21	820.24	2,184.00	1,077.56
Bed occupancy ratio (in days)	0.47	0.24	0.44	1.25	0.38	0.24	0.55	0.18	0.61	0.19
Total medical income	202.48	195.4	133.28	99.72	129.34	99.81	209.85	171.93	418.69	311.31
Medical income	78.99	88.29	50.42	47.24	48.4	47.31	92.15	92.23	152.8	138.06
Income from drug sales	123.49	112.18	82.85	56.77	80.94	56.28	117.79	83.53	265.88	181.39

Source: Authors' database.

Note: [a] All monetary variables are in 10,000 RMB and normalized to 2000 constant prices (Shandong province price index, Statistical Yearbook 2009).

the "treatment" effect of the reform. Influence of covariates will be tested (and excluded) to assess a potential selection on observable characteristics. Selection on unobservable characteristics is probably true, and allowed by the double-difference approach. As there is only one township hospital per township, we use "i" to represent either township hospital or township. Let Y_{it} be the outcome variables for township hospital i at time t. Four outcomes are studied: 1) For activity: the number of outpatient visits, the number of inpatients, and the bed occupancy rate, 2) For income structure of township hospitals: the share of income from drug sales in medical income. P_{it} is a dummy variable equal to 1 if in year t the township i is covered by the New Rural Cooperative Medical Scheme, and 0 otherwise. The coefficient of P_{it}, δ, is the parameter of interest. It represents the estimated average effect of the New Rural Cooperative Medical Scheme implementation on hospital outcomes. The estimated model, in first-difference, is the following:

$$\Delta \ln(Y_{it}) = \Delta P_{it} + \Delta v_t + \Delta \varepsilon_{it} \quad (1)$$

Using the well-discussed tests of the literature (Aker, 2010; Barham, 2011; De Janvry et al., 2010; Galiani et al., 2008; Gruber & Hanratty, 1995; Imbens & Wooldridge, 2008; Wagstaff & Moreno-Serra, 2009), we checked that we obtained an unbiased and consistent estimator of the impact of the New Rural Cooperative Medical Scheme: 1) the pre-intervention outcome trends are similar across groups which entered the reform at different times (parallel trend hypothesis), 2) the date of New Rural Cooperative Medical Scheme introduction is not driven by the changes in the outcome trends during the 3 years before the implementation of the reform, 3) there is no selection on unobservable characteristics, and 4) selective migration is not an issue in this study.

3. RESULTS AND DISCUSSION

We estimated six models (Table 3) for each of the four dependent variables which are outpatient and inpatient visits, bed occupancy rate, and share of selling drugs in the township hospitals income. The first model assesses the impact of New Rural Cooperative Medical Scheme based on equation (1), while the second one takes into account the 7 covariates included in the test for the exogeneity of the reform. Covariates are: 1) at township level: the size of the catchment area, the number of households, the number of village health stations, and the rural net income per capita, 2) at township hospital level: the total number of staff, the number of operational beds and the total amount of subsidies received. In model 3, the participation dummy (Is the reform implemented or not for the concerned year t, in the catchment area of the township hospital i?) is replaced by the share of the population covered by the New Rural Cooperative Medical Scheme in the relevant township in order to capture the intensity of the reform[26]. Models 4 and 5 break down the impact of the New Rural Cooperative Medical Scheme according to the socio-economic characteristics of the population in the township and the nature of the township hospital. Model 6 explores the effect of the reform over time.

3.1. Overview of Main Results

Model 1 shows that the introduction of the New Rural Cooperative Medical Scheme had a mixed impact. The reform had significant impact neither on the volume of outpatient visits (including outpatient visits

was not compulsory in the global design of the reform, but they are part of the benefit package offered in Weifang prefecture) nor on the income structure of township hospitals. But a significant and positive impact was found on the utilization of inpatient medical services. Households have therefore changed their behavior considering that township hospitals have become more attractive that the alternative, mainly county hospitals (we go back below about the reasons). Compared to the situation without the New Rural Cooperative Medical Scheme, the number of inpatients increased in average by 57% and the bed occupancy ratio, by 7.5%. Those results are in line with the primary objective of the reform to focus on inpatient services.

The significance of these results is robust and coefficients are stable when covariates are added (Model 2), showing that the introduction of the covariates does not influence the schedule of the New Rural Cooperative Medical Scheme implementation (P_{it}) or the explanatory variables (Y_{it}).When substituting the participation dummy by the share of the population covered by the reform in the township to capture the intensity of the reform (Model 3), results confirm that township hospital activity is positively impacted by the reform, including for outpatients. The utilization of township hospitals increases alongside the development of the New Rural Cooperative Medical Scheme: when the coverage rate of population increases by 1% in the township, the number of outpatient visits, the number of inpatients, and the bed occupancy ratio increased respectively by 2%, 5% and 7%.

3.2. Impact on Inpatients and Outpatients

Estimations confirm that the reform had an impact on the utilization of township hospitals, but as in the literature, our results are mixed depending on the kind of medical activities. Inpatient services are enhanced by the reform while no clear effect has been highlighted for outpatient services (no impact in models 1 and 2, positive impact with model 3). The absence of a clear impact of the reform on the number of outpatient visits may be explained by the fact that the reform increases consultations at village health stations (village health stations) for basic medical needs (Wagsatff et al., 2009). Village health stations are better supervised by township hospitals to push them to improve quality in their delivery of basic outpatient services.

These results for Weifang are consistent with those in the literature about the impact of the introduction of health insurance in other Chinese regions (Barbiaz et al., 2010, Wagstaff et al., 2009b; You & Kobayashi, 2009; Wagstaff & Moreno-Serra, 2009). They also fit with government's expectations, as the reduction in hospitalization costs borne by households is a way to promote the use of hospitalization services at township hospital level, leading to the rise in the number of hospitalizations and of the bed occupancy ratio. The increase in this ratio is not only due to the increase in the number of inpatients, but also to an elongation of the average length of stay. This increase in average length of stay reflects both a change of case-mix and modification in patients' behavior requiring less to be prematurely discharged for financial reasons.

This being said, our findings don't provide information about the true nature of the increase of township hospitals' utilization: we do not know to what extent it is due to a *net* increase in total health care demand, or if a share of this demand for township hospitals' health care stems from a transfer of demand from the county hospitals (upper level). Before the insurance reform, the township hospitals suffered from a rather poor reputation regarding the quality of care, and from a poor value for money. For these reasons, the population had a high tendency to bypass the township hospitals to apply directly to the county hospitals where the perceived quality by patients was better, but with much higher prices.

The implementation of New Rural Cooperative Medical Scheme, coupled with the efforts of the Health Bureau to improve the quality of care in township hospitals, has changed the preferences of a segment of the population in favor of the township hospitals because they were becoming more attractive. This shift of demand took place at the disadvantage of county hospitals.

Discussing with Health Bureau, it appears that a kind of bandwagon effect has also occurred, people copying the decision of others regardless of what their internal signal could have eventually told them in some case.

3.3. Poor Townships Benefit More

Our results show that the New Rural Cooperative Medical Scheme increased the volume of inpatients more in poor townships than in rich ones (Model 4). Such a result is not surprising because household capacity to pay (measured by the income) is often the main obstacle to hospitalization, and the price elasticity of demand is higher for poor households. As the insurance gives similar financial support to all the insured, it represents a bigger proportion of their capacity to pay for the poor than for the rich.

Nevertheless, we cannot infer from this that the catastrophic health care expenditures have been drastically reduced. The literature analyzing the impact of the reform on catastrophic expenditures finds no clear evidence of such effects (Sun et al., 2009, Wagstaff et al., 2009b; Wagstaff & Lindelow, 2008). Wagstaff & Lindelow (2008) found that in Gansu province, medical insurance had led households to search for more specialized and costly care. As a result, they detected an increase in catastrophic expenditures. In the same way, Sun et al. (2009) stress that the effect of the New Rural Cooperative Medical Scheme on the financial burden of rural households is limited.

3.4. No Specific Impact on the Composition of the Township Hospitals Income

Our estimations show no impact of the New Rural Cooperative Medical Scheme on the income structure of township hospitals. Despite, and because of, the increase in activity, the sale of drugs continues to be the most important source of income for the township hospitals. As long as the profit margin from sale drugs is higher than that from providing medical services, township hospitals staff had incentives to overprescribe drugs. This misalignment of incentives distorts the behavior of medical staff because the amount of their individual income is directly affected by the amount of profit made on drugs sold by the whole staff. This is typically an illustration of a perverse peer pressure effect combined with a kind of Hawtorne type effect: individuals are pushed to adopt the behavior of their peers and due to asymmetric information and principal-agent relationships, patients having bounded rationality are embedded in the current "rule of the game" (this applies to village health stations and county hospitals and not only to township hospitals). The new drug policy reform, implementing a National Essential Medicine List was introduced in 2009 in Weifang. Township hospitals are allowed to sale only drugs on the list and with a "zero markup" (no profit). It cuts off the profit of prescribing drugs by the township hospitals, and thus has drastically changed the pattern of incentives and the behavior of staff: most of township hospital's income is government subsidies, which for some of them, has more than offset the loss of income from the zero-mark up policy on selling drugs (Mathonnat et al., 2015; Petitfour et al., 2015).

3.5. Same Impact on Both Types of Township Hospital

Township hospitals are divided in general and central. Theoretically, their missions and responsibilities are complementary. Central township hospitals are better equipped to treat hospitalizations than general township hospitals. Model 5 check whether there is a different impact on the New Rural Cooperative Medical Scheme depending on the status of the township hospital. Results show no evidence of such heterogeneous impact of the reform. The significance of the participation dummy confirms the previous results (Models 1 and 2).

3.6. Decreasing Marginal Effect of the Scaling Up of the Insurance Reform

Inspired by Galiani et al. (2008) paper on education, we investigate whether there is a differential effect of the New Rural Cooperative Medical Scheme over time, depending on the number of years since the beginning of New Rural Cooperative Medical Scheme implementation in a township. This could reflect some kind of "experience effect" of the enlarging New Rural Cooperative Medical Scheme implementation which may affect its global impact. It is therefore expected that, for example, for a year t, the marginal effect on local stakeholders' behavior of a New Rural Cooperative Medical Scheme established for 3 years will be greater than the effect of a New Rural Cooperative Medical Scheme established only a year ago. This "experience effect" is captured by a discrete variable that takes 0 for the year in which the reform is implemented, 1 when the it has been implemented for one year, 2 when it has been implemented for two years, etc., assuming that there is a linear trend in the impact of the reform (Model 6). Results show that the marginal impact of the reform on the township hospitals activity outcome declines over time. This result is not going in line with the effect that we expected.

Several explanations can be put forward: 1) before the reform, a part of the health care demand was limited by the costs of health care borne by households. With the introduction of the New Rural Cooperative Medical Scheme, the financial barrier to healthcare access has been reduced, pushing up the patient flow into township hospitals, a large initial impact of the reform coming from an unmet "stock" of health care demand, but this "stock effect" has vanished progressively; (2) The village health stations are under the supervision of township hospitals. Almost in parallel to the reform, township hospitals have been requested by the Weifang Health Bureau to take measures to strengthen their control over villages health facilities in order to improve the quality of health care they deliver and to reduce the unnecessary visits to township hospitals; these changes in the behavior of health care providers were gradual; (3) In 2005-2006, efforts were made by Weifang health authorities to improve the quality of care and to increase the reimbursement rates in county hospitals. Therefore, the *relative* attractiveness of township hospitals compared to county hospitals could have slightly declined after some years, due to a new competition between both township hospitals and county hospitals for certain types of healthcare.

4. CONCLUSION

Overall, the development of the New Rural Cooperative Medical Scheme was rapid, leading to a change in behavior of all stakeholders: households, health care providers (township hospitals and village health stations) and Health Bureau. Our results show a positive impact of the reform on the activities of medical services in township hospitals, particularly for inpatient services and more in poor areas than in the

Table 3. Impact of the new rural cooperative medical scheme

	Ln (Outpatient Visits)	Ln (Inpatients)	Bed Occupancy Rate	Share Drug Sales
Participation	*Model 1: Impact of the New Rural Cooperative Medical Scheme*			
	0.151	0.478**	0.0841***	1.066
	(0.0899)	(0.172)	(0.0258)	(1.547)
Participation	*Model 2: Impact of the New Rural Cooperative Medical Scheme (covariates included[a])*			
	0.149	0.454**	0.0754**	1.140
	(0.0932)	(0.171)	(0.0270)	(1.556)
Coverage rate of the New Rural Cooperative Medical Scheme	*Model 3: Intensity of the New Rural Cooperative Medical Scheme*			
	0.00203*	0.00529**	0.000685**	0.0157
	(0.00115)	(0.00209)	-0.000316	-0.019
Participation Participation*Poor *(1=poor, 0 otherwise)*	*Model 4: Level of development*			
	0.150	0.392**	0.0468	1.071
	(0.0979)	(0.172)	(0.0280)	(1.553)
	-0.00580	0.302*	0.138***	0.333
	(0.142)	(0.170)	(0.0428)	(2.525)
Participation Participation*hospital level *(1=central, 0=general)*	*Model 5: Status of the township hospital*			
	0.208	0.382**	0.0983***	-0.237
	(0.125)	(0.161)	(0.0341)	(1.877)
	-0.159	0.191	-0.0607	3.661
	-0.143	-0.381	-0.0479	-2.491
No. of years after New Rural Cooperative Medical Scheme	*Mode 6: Experience effects*			
	-0.127**	-0.278***	-0.0523**	-0.494
	(0.0541)	(0.0985)	(0.0231)	(1.320)

Source: Authors' calculations.

Note: Standard errors (in parentheses) are corrected for heteroskedasticity and clustered at township level. *** indicates significance at 1%; ** at 5%; and, * at 10%. The model is estimated by OLS with year fixed-effects and covariates are included (except in Model 1).

[a]*List of covariates included:* seven covariates are included at township level - the surface area, the number of households, the number of village health stations, and the rural net income per capita. At the township hospital level, the number of total staff and that of operational beds, and the total amount of subsidies received.

others. It was part of the objectives of the Government. But we find no significant impact of the reform on the income structure of township hospitals, because incentives to over-prescribing and selling drugs remained unchanged before the National Essential Medicine Policy.

As the New Rural Cooperative Medical Scheme now covers almost the whole rural population, efforts should be focused on the characteristics of the benefit package and on increasing selectively the reimbursements of care delivered at township hospitals level in order to maintain the attractiveness of township hospitals in the medium and long terms between the lower level (village health stations) and the upper one (county hospitals). This is in line with the objective of a rational Chinese health system. If not, this would be a damaging evolution running against the national health policy and against the necessary improvement of the efficiency of the global Chinese health care system. Furthermore, in that sense, better quality and higher efficiency of the township hospitals health care delivery should

be reinforced. Two approaches should be pushed forward: reforming the provider payment mechanism incorporating elements of result based financing and New Rural Cooperative Medical Scheme moving from a position of passive health care purchaser to a strategic behavior in order to align incentives with the objectives of the national health policy (Audibert et al., 2013).

Our findings also highlight various elements related to the behavior of stakeholders, and coming in addition to those specified in the above analysis. First, the findings confirm the importance of issues related to asymmetric information in decision making. Households can hardly acquire information allowing them to choose in full knowledge the health care provider (a village station, township or county hospital) who better suits to their utility function. Choosing providers is also modulated by the effects of reputation of the health facilities at various levels. Effort has been made by the authorities to restore households' confidence in township hospitals, but there remains a gap to be filled. Our discussions with the health authorities suggest also that the framing of the available information for patients, in which the "high-tech" nature of care is emphasized, plays a substantial role, beside more traditional factors, in choosing the health care provider. Second, our results show that healthcare providers have developed strategic behaviors based on the misalignment of incentives with the objectives of the reforms. On one hand, the development of insurance favor lower cost of care for patients, On the other hand, strategic behaviors of township hospitals staff having compensation they consider unattractive, push them for providing health care not covered by insurance, part of them being unnecessary. Moreover, the longer average length of stay for inpatients observed after the implementation of NCMS raises questions about its causes regarding the behavior of health staff: only for improving quality of care or/and as an easy way to generate additional revenue? Finally, and this is related to the previous points, our findings highlight the importance of basing any reform on a theory of change not limited to behavioral analysis of stakeholders in a specific reform alone. Our observations suggest that insufficient attention was paid to perverse incentives related to the modalities of health care provider's compensation, to the process of appointment of hospital directors and to the importance of guanxi, the network shaping relations between health authorities, insurance and providers, blurring the chains of accountability, what has been also observed in other regions (Qian, 2015). All this makes the subjective expected utility of health care providers very difficult to decipher. Therefore, tailoring appropriate governance arrangements and managerial practices, and calibrating the right incentives to be aligned with the objectives of the government policy, is a very challenging goal to be achieved. Furthermore, these behavioral issues are not specific to the health sector and to China, but they are crucial. As emphasized by Levy and Peart (2015), "perhaps a policy fails because it fails to align private goals of acting individuals who administer the policy and those in the collective polity who establish the administrating agencies on the basis of an articulation of public goals. … If a policy is designed to address a "public" goal at the expense of the private hopes and desires of those who make up the collective, its failure may be altogether predictable, as those whose hopes and desires conflict with the policy are motivated to undermine the "public" policy goals (p. 669).

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Chapter 8
Anatomy and Significance of Public Healthcare Expenditure and Economic Growth Nexus in India:
Its Implications for Public Health Infrastructure Thereof

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ABSTRACT

The objective of this chapter is to take a closer look at the liaison between the two focus variables viz. growth and public healthcare expenditure, and the associated implications for public health infrastructure development. Initially, a theoretical model has been proposed which brings out the link between the focus variables. Panel cointegration and causality are the techniques applied in a Vector Error Correction Mechanism (VECM) set-up using panel data from 1980-2015. Next, a health infrastructure index has been constructed using the Euclidean distance function approach for India for two time points i.e. 2005-06 and 2014-15, to evaluate the interstate performance in public healthcare infrastructure. The findings validate the existence of a cointegrated relationship between health expenditure and economic growth coupled with a bidirectional causality linking the focus variables in this model. It comes to a close by highlighting the policy implications and the future research possibilities in this regard.

INTRODUCTION

It is health that is real wealth and not pieces of gold and silver. — Mahatma Gandhi

In the quest for achieving economic development, development of infrastructure in terms of both quantity and quality is a must. It is suggested that infrastructure supports the processes of growth on which much

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of poverty reduction depends and also assists the poor to have an access to the basic services which can improve their lives and the standard of living. There are several studies that establish the constructive impact of infrastructure on economic growth and productivity. For a systematic understanding of the healthcare policy and the associated welfare mechanisms, it becomes crucial to scrutinize the health infrastructure condition of an economy.

Now, coming to the notion of health infrastructure, it has been expressed as the basic support for the provision of public health services. It is one of the critical indicators for understanding the investment priorities with regards to the creation of health care facilities and welfare mechanisms in a country. By and large, the five components of health infrastructure can be categorized as – the percentage of competent workforce; an integrated electronic information system; number of public health organizations, material resources and ongoing research in the health arena (Novick & Mays, 2005). In the context of health infrastructure, the focus should not only be on the end results of healthcare policy but also on capacity building in the domain of public health delivery mechanisms. In India, the healthcare services are alienated into State List and Concurrent List. Some items like public hospitals come under the jurisdiction of the State List, while population control and family welfare, medical education, and quality control of drugs are included in the Concurrent List. The Union Ministry of Health and Family Welfare (UMHFW) function as the pivotal force for the implementation of various schemes in the field of family welfare, curative prevention, and control of major diseases.

Healthcare in India has been developed as a three-tier structure. The Sub-Centres form the lower tier of the structure followed by Primary Health Centres and Community Health Centres forming the middlemost and uppermost tiers respectively. Talking about the recent health infrastructure position in India, there exist 1 Sub-Centre per 5,000 populations in the general areas and 1 Sub- Centre per 3,000 populations in the tribal and hilly areas. For Primary Health Centres, the figure stands at 1 per 30,000 populations and 1 per 20,000 populations in the general and tribal areas respectively. One can locate 1 Community Health Centre per 1,20,000 populations in the general areas and 1 per 80,000 populations in the tribal and hilly areas. Coming to the overall position, there are 1,53,655 Sub-Centres (SCs), 25,308 Primary Health Centres (PHCs), 5,396 Community Health Centres (CHCs), 1022 Sub-divisional Hospitals (SDHs) and 763 District Hospitals (DH) in the country. There is an acute shortfall of 33145 SCs (20 per cent), 6556 PHCs (22 per cent) and 2316 CHCs (32 per cent) across the country as per the Rural Health Statistics of 2015. There needs to be a lot of improvement in this arena given the fact that India's total health expenditure is 4 per cent of GDP whereas public health expenditure stands at an all time low of 1 per cent of GDP. In this backdrop, this paper explores the impact of health expenditure on growth and also the position of the states with regards to the health infrastructure situation.

Although, studies about of the interaction between health and per-capita economic growth have been flourishing but panel data studies for any of the developing countries is a rare phenomenon. So, a modest attempt has been made in this regard. The rest of the paper has been organized as follows. To start with, a brief evaluation of the select literature on the liaison between healthcare expenditure and economic growth has been carried out in Section 2. In Section 3, a theoretical construct has been developed to draw out the relationship between the focus variables. Section 4 illustrates the methodology employed and puts forward the empirical results and the discussions thereof. Section 5 looks at the health infrastructure in India, in the light of healthcare expenditure It comes to a close by highlighting the policy implications and the future research possibilities in this regard.

REVIEW OF SELECTED LITERATURE

One of the essential issues in healthcare systems across the world is that what factors control the resources a country allocates to medical care. The share of health expenditures of GDP in the developing countries is often less as compared to the developed countries. The role of health care spending on stimulating economic growth was first suggested by Mushkin (1962). This is known as the "health-led growth hypothesis". According to Mushkin's hypothesis, "health is a capital, thus investment on health can increase income, hence lead to overall economic growth." In fact, health affects the growth prospects of a nation through its impact on human and physical capital accumulation. Since healthier people are much more productive, they have a strong incentive to develop their knowledge and skills because they want to savor the benefit over a longer period of time (Bloom & Canning, 2000). In contrast, poor health status has an unfavourable impact on productivity, thus it transpires to be a significant factor in explaining the under-development in many regions throughout the world.

On the other hand, economic growth can also liven up the health status of the population in two aspects:– Firstly, economic growth implies rising per-capita income and a part of this increased income goes into the consumption of a higher quantity of nourishing food. As a result, health improves. Secondly, economic growth is fueled by the technological health care expenditure and part of this progress is reflected in improvements in medical science. From the microeconomic perspective, when individual's income is low, demand for medical care also tends to be low. As a result, the marginal rate of return to invest in health through medical care investment is very high. Hence, a small percentage increase of income will strongly improve the health state. When an individual attains a very healthy condition, an additional income will not make this individual healthier, but stagnant. As a result, the effect of economic growth on the health status of a nation is concave and depends on the level of development (Preston, 1975).

The theoretical relations proposed by the two schools of thought have been summarized below. Following Halder and Mallik (2010), with the help of an implicit production function (standard assumptions are applicable):

$$Y = Y(K, N, H) \tag{1}$$

where, Y stands for the aggregate output, H stands for the stock of human capital i.e. investment on health and education and N stands for the aggregate employment in the economy. If health can be treated as an investment in human capital — an increase in the health expenditure must in due course lead to higher economic growth. Since better health leads to higher labour productivity, hence, that would pave the way for higher growth (Behrman & Deolalikar, 1988).

Totally differentiating equation (1), with respect to time t and then dividing throughout by Y, we have:

$$\frac{1}{Y}\left(\frac{\partial Y}{\partial t}\right)=\frac{1}{Y}\left(\frac{\partial Y}{\partial K}\right)\left(\frac{\partial K}{\partial t}\right)+\frac{1}{Y}\left(\frac{\partial Y}{\partial N}\right)\left(\frac{\partial N}{\partial t}\right)+\frac{1}{Y}\left(\frac{\partial Y}{\partial H}\right)\left(\frac{\partial H}{\partial t}\right)$$

This implies that,

$$y = MP_K \frac{I_K}{Y} + MP_N n \frac{N}{Y} + MP_H \frac{I_H}{Y} \tag{2}$$

Here, $y = \left(\frac{\frac{\partial Y}{\partial t}}{Y} \right)$ = rate of growth of output; $n = \left(\frac{\frac{\partial N}{\partial t}}{N} \right)$ = rate of growth of employment; I_H stands for the investment in human capital which implies that $\left(\frac{\partial H}{\partial t} \right) = I_H$. Also, $\left(\frac{\partial Y}{\partial H} \right) = MP_H$ is nothing but marginal productivity of human capital and it is assumed to be greater than zero. Similar argument holds for investment in physical capital. Similarly, $\left(\frac{\partial Y}{\partial N} \right) = MP_N$ is nothing but the marginal productivity of labour and it is also positive given the standard assumptions. If one looks at the various components of equation (2), it is clear that the growth rate of output depends not only on the investment possibilities in physical capital but also in human capital. The more a country invests in health infrastructure, the more is the level of human capital, the greater will be the growth rate of output. So, from equation (2), it is clear that there exists a theoretical liaison between economic growth and health human capital.

Shifting the focus, a variety of empirical studies, based on time-series or cross-country data, have estimated the extent of the contribution of public expenditures to economic growth. Some studies try to associate levels of public expenditures to growth while others focus have focused on the relationship between certain expenditure components, such as public investment which includes education or health expenditures. Some studies (Devarajan, Swaroop & Zou 1996; De & Endow, 2008) have predicted a positive unidirectional relation between the focus variables while others (Baltagi & Moscone, 2010; Erdil & Yetkiner, 2009) have hit upon a positive bidirectional impact between health expenditure and income. The authors of Baltagi and Moscone (2010) examined the long run relationship between health expenditure and income growth in 20 OECD countries during 1971-2004. The study by Erdil and Yetkiner (2009) shows that the bidirectional causality between health expenditure and GDP growth depend on the type of countries *viz*. high, low and middle income countries. Their analysis brings to light that one-way causality runs from GDP to healthcare expenditure in the low and the middle income countries, whereas the reverse holds for high income countries. Initially, health expenditure acts as an investment in human capital, and given that human capital accumulation is an elemental source of economic growth, an increase in healthcare expenditure in due course leads to a higher level of GDP. Additionally, an increase in the healthcare expenditures associated with effective health intervention increases labour supply and productivity. This in turn increases the earnings of an individual which ultimately leads to a rise in GDP. Thus, all kinds of expenditure on health make a positive contribution to economic growth by developing the quality of human capital. Taking a walk down memory lane, the study by Sorkin (1978) can be regarded as one of the earliest studies of its kind to examine the impact of health on economic growth. Sorkin (1978) argues that a decline in the birth rate positively affects economic growth. Similar research papers such as Arora (2001) scrutinized the effect of health on economic growth for 10 industrialized countries. With a rise in the growth rate, health parameters have significantly improved. Bhargava et al. (2001) have studied the impact of health indicators for the period 1965-90 for developed and developing countries. The extent of increase in economic growth performance with the improvement in public health in developing countries is much more as compared to the developed countries. Going by Bloom et al. (2001), an annual improvement of 1 year in the life expectancy component makes an increase of growth to the tune of 4 per cent. Howitt (2005) highlighted the channels that influence the health of the country in the light of Schumpeterian growth theory. Some time series studies like Halder (2008),

McCoskey and Selden (1998) have tried to focus on the direction of causality and issue of cointegration between health expenditure and growth. The empirical literature however brings in controversial results as research papers have come up with bidirectional, unidirectional or no causality results (Devlin & Hansen, 2001). Heading for a different issue, Aghion et al. (2011) portrays the relationship between health and growth in the light of modern endogenous growth theory and observed that in those OECD countries where mortality rates are less than 40 years have experienced increase in growth. In India, studies with regard to the trivariate analysis of growth, health infrastructure and health expenditure are very few. Ghei et al. (2010) found positive association between child immunization and availability of adequate healthcare infrastructure whereas Datar, Mukherji and Sood (2007) showed that the availability of healthcare infrastructure had only a modest effect on immunization coverage. These are a few studies that have dealt with this particular issue.

AN ILLUSTRATIVE MODEL

In this framework, the author has considered a three-equation model (at the individualistic level) comprising of health status, health expenditure and income earned by a person in a given period. To expand the concept of the inter-relationship between health expenditure and economic growth and how the dynamics have evolved, a framework of difference equations has been used. The difference of this model with the one proposed by Hurd and Kapteyn (2003) lies in the fact that it was developed in the context of a discrete time variable that is the time variable is only permitted to take integer values, as against a continuous time variable. The pattern of change of variables over a period of time must be described by the expected differences rather than by the derivatives or differentials. This structure is very much applicable given the fact that all the major variables in this framework can be considered at discrete time points. Before moving onto the structure of the model, the set of assumptions following Hurd and Kapteyn (2003) have been discussed below.

1. Healthcare spending depends on income but it varies across the population.
2. Health and its evolution depend on the amount of spending on healthcare facilities.
3. Healthcare spending includes spending on nutrition, housing, medical insurance and several other attributes that affect health.
4. Income growth at the current period depends on the current health status.

Let y_t be the earnings, h_t be the health status and s_t be the spending on healthcare at age t and be y_{t+1} the earnings, h_{t+1} be the health status and s_{t+1} be the spending on health at age $(t + 1)$. Then, consider this simple system of difference equations:

$$y_{t+1} = a + bh_t \tag{3}$$

$$h_{t+1} = c + ds_t \tag{4}$$

$$s_t = e + fy_t \tag{5}$$

Substituting equation (5) in (4), we get

$$h_{t+1} = c + d[e + fy_t] \tag{6}$$

or, $h_{t+1} = [c + de] + dfy_t$ or, $h_{t+1} = g + ky_t$ where, $g = c + de$ and $k = df$.

This is a system of simultaneous difference equations consisting of equation (3) and equation (6).

The generic solution of this system of difference equations is given by the 'particular solution' together with the complementary function.

In matrix notations, equation 6 shows,

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} y_{t+1} \\ h_{t+1} \end{pmatrix} + \begin{pmatrix} 0 & -b \\ -k & 0 \end{pmatrix}\begin{pmatrix} y_t \\ h_t \end{pmatrix} = \begin{pmatrix} a \\ g \end{pmatrix} \tag{7}$$

If stationary equilibrium exists, the particular solution can be expressed as $y_{t+1} = y_t = \bar{y}$ and $h_{t+1} = h_t = \bar{h}$. Substituting these values in the matrix form,

$$\bar{y} - b\bar{h} = a \tag{8}$$

$$\bar{h} - k\bar{y} = g \tag{9}$$

Solving (8) and (9) simultaneously, the particular solution is:

$$\bar{h} = \frac{ak + g}{1 - bk} \text{ and } \bar{y} = \frac{a + bg}{1 - bk}$$

The search for the complementary function, based on the trial solutions mr^t and nr^t, involves the reduced form of the matrix since $r^t \neq 0$

$$\begin{pmatrix} r & -b \\ -k & r \end{pmatrix}\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \tag{10}$$

In order to avoid the trivial solutions, set

$$\begin{vmatrix} r & -b \\ -k & r \end{vmatrix} = 0$$

or, $r^2 - bk = 0$ or, $r^2 = bk$ or, $r = \pm\sqrt{bk}$

Assuming only positive values or r (given both b and k to be positive), the solution is

$$y_t = m\left(\sqrt{bk}\right)^t + \left(\frac{a+bg}{1-bk}\right) \tag{11}$$

$$h_t = n\left(\sqrt{bk}\right)^t + \left(\frac{ak+g}{1-bk}\right) \tag{12}$$

Given the values at the initial level, one can definitize the value of m and n. The values of m and n are basically functions of the initial health and the income variables and the final solution of the model is:

$$y_t = \left[y_0 - \left(\frac{a+bg}{1-bk}\right)\right]\left(\sqrt{bk}\right)^t + \left(\frac{a+bg}{1-bk}\right) \tag{13}$$

$$h_t = \left[h_0 - \left(\frac{ak+g}{1-bk}\right)\right]\left(\sqrt{bk}\right)^t + \left(\frac{ak+g}{1-bk}\right) \tag{14}$$

Consequently, equation (13) has to be substituted in equation (5) to derive the time path of health expenditure.

For convergence of the time paths in case of equations (13) and (14), $\sqrt{bk}$ has to be less than 1 but the empirical dynamics of the convergence issue has been left for further research. The time paths demonstrate that an individual's income and health status will act in an analogous manner depending on the initial health status and income levels.

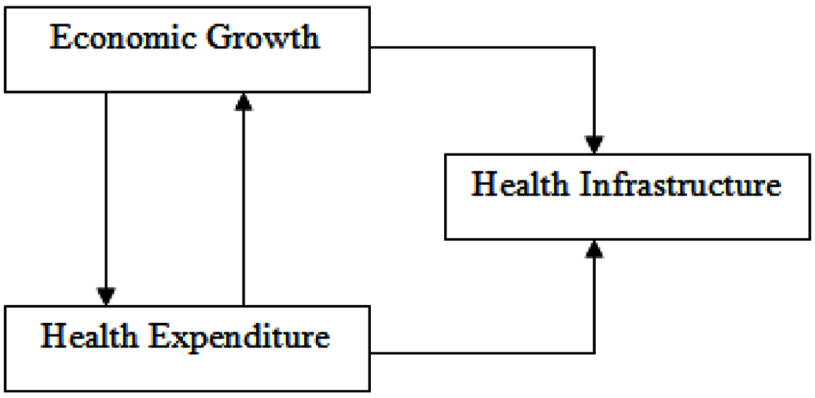
THE EMPIRICAL FRAMEWORK

The theoretical structure developed in the preceding section will motivate the empirical structure used in this segment. The idea is to generalize this micro model to a macro model empirically. Ideally, one should consider a simultaneous equation framework which enables the measurement of feedback effects and establishes the interdependence between economic growth and health expenditure. This has been represented in the following schematic diagram (Figure 1).

Data Description

This paper evaluated the causality and long-run relationship existence between economic growth (using Gross State Domestic Product, GSDP) and public healthcare expenditure (PHE) across 23 major states in India from 1980-2015 using Panel Cointegration method. The 23 major states on which this analysis has been carried out includes — Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West

Figure 1. The Causal Nexus



Bengal. Uttarakhand was created out of Uttar Pradesh in 2000, so the data for Uttar Pradesh post 2000 includes the data of Uttar Pradesh plus Uttarakhand to maintain uniformity. Same is the case for Bihar and Madhya Pradesh which includes the data for Jharkhand and Chattisgarh post 2000. In the backward areas, private healthcare institutions are limited and to get an appropriate idea of the extent of public healthcare intervention, the spotlight has been only on public healthcare expenditure. Also, since the objective of this paper is to throw light on the public health infrastructural issues, private healthcare expenditure has not been taken into account. Annual data on the necessary components have been extracted from the Sample Registration System-Registrar General, Budget minutiae of the State Governments, the Reserve Bank of India Bulletin (several issues), Central Statistical Organization and the Ministry of Statistics and Programme Implementation (MOSPI), Government of India, New Delhi. Also, for extracting data on the per-capita state GDP at market prices, the website www.indiastat.com was visited. In order to avoid the scale effect, the author has considered state public healthcare expenditure as a percentage of the GSDP (both in real per-capita terms) coupled with real per-capita GSDP growth rate. It should be noted that the expenditure on health does not include fund allocation for water supply and sanitation.

Econometric Methodology

Before starting off with the panel unit root tests, the heteroskedasticity needs to be looked at. The Chi-Square value of 18.22 in Table 1 is low and lies within the confidence limits and the results undeniably confirm the absence of heteroskedasticity as the null hypothesis of "constant variance in the model" gets accepted. The foremost difference lies in the fact that in case of a panel data study, it is required to take into account the asymptotic behaviour of the time-series dimension *T* and cross-sectional dimension *N*.

Table 1. Heteroskedasticity results

	Likelihood-Ratio Test	
H_0: Constant variance	LR Chi-Square value (χ^2)	Probability > Chi-Square (χ^2)
	18.22	0.98*

Notes: * denotes significance at 95 per cent level and calculation has been done by the author in Stata 12

Levin, Lin and Chu (LLC) unit root tests have been used in this study. The test is based on their model given below:

$$\triangle y_{it} = \alpha_i y_{it-1} + \sum_{j=1}^{p_j} \beta_{ij} \triangle y_{it-j} + x_{it}^{'} \delta + \varepsilon_{it}$$

Here, α_i is the error correction term and consequently, the null hypothesis of non-stationarity is as follows:

Tests hypotheses:

H_0: α_i=0 for all the cross section units, so the series is non-stationary and has a unit root.
H_1: α_i<0 for at least one cross section unit, so the series is trend stationary.

When the probability value obtained from the test results is smaller than 0.05, H_0 is rejected and the stationarity of the series gets determined. LLC panel unit root test results that I have got are reported in Table 2. As Levin, Lin and Chu (2002) have pointed out; this test-statistic performs well when N lies between 10 and 250 and when T lies between 5 and 250. To determine whether a cointegrating relationship exists or not, the methodology proposed by Pedroni (1999) has been employed. Fundamentally, it employs four panel statistics and three group panel statistics to test the null hypothesis of no cointegration against the alternative hypothesis of cointegration. The first set is the within-dimension approach comprising of four statistics that are - panel *v*-statistic, panel ρ-statistic, panel PP-statistic and the panel ADF-statistic (Pedroni, 1999). This set pools the autoregressive coefficients across various members for the unit root tests to be carried out on the estimated residuals. The second set of statistics, centered on the between-dimensional approach, includes three statistics that are respectively the group ρ-statistic, group PP-statistic and group ADF-statistic. If the variables are not cointegrated it implies that the residuals are not I(0). These estimators are based on Monte Carlo simulations and the details for these calculations are given in the original paper (Refer to Pedroni, 1999). If the null hypothesis is rejected in the panel case, then the variables in question are cointegrated for all the 23 states considered. On the other hand, if the null is rejected in the group panel case, then cointegration among the relevant variables exists for at least one of the states. The VECM framework used has been given below.

$$\triangle GDP_{i,t} = \alpha_{1,i} + \varphi_{1,i} ECT_{i,t} + \sum_{j=1}^{k} \beta_{1,j,i} \triangle HE_{i,t-j} + \sum_{j=1}^{k} v_{1,j,i} \triangle GDP_{i,t-j} + \varepsilon_{1,i,t}$$

$$\triangle HE_{i,t} = \alpha_{2,i} + \varphi_{2,i} ECT_{i,t} + \sum_{j=1}^{k} \beta_{2,j,i} \triangle HE_{i,t-j} + \sum_{j=1}^{k} v_{2,j,i} \triangle GDP_{i,t-j} + \varepsilon_{2,i,t}$$

Where i (i = 1,…N) denotes the state, t (t = 1,...T) the period, j is the optimum lag considering the Akaike Information Criteria (AIC). ECT is the lagged error correction term derived from the long-run co-integrating relationship; the φ_1 and φ_2 are the adjustment coefficients and $\varepsilon_{1,i,t}$ and $\varepsilon_{2,i,t}$ are disturbance terms assumed to be white-noises and uncorrelated. The coefficients on the ECTs represent how fast the

deviations from the long-run equilibrium are eliminated following a change in each of the variables. If the ECTs coefficients are zero ($\varphi_{1,i} = 0$, or $\varphi_{2,i} = 0$) for all i, then there is no error correction and thus there exists no contegration. But if ($\varphi_{1,i} < 0$, or $\varphi_{2,i} < 0$) then there exists error correction and consequently, we have cointegration. This paper examines the health expenditure and per-capita GDP growth rate relationship by taking advantage of the heterogeneous panel cointegration framework developed by Pedroni (1999) across the 23 major states in India. It should be noted that the first four statistics comply with the 'within-dimension' based terminology of panel data and the rest are 'between-dimension' based statistics. Now, I move on to the causality issue in case of panel data. Given that, this analysis is being carried out across the 29 states in India, the assumption that coefficients are different across cross-sections follows from Dumitrescu and Hurlin (2012), i.e:

$\alpha_{0,i} \neq \alpha_{0,j}$, $\alpha_{1,i} \neq \alpha_{1,j}$, …, $\alpha_{p,i} \neq \alpha_{p,j}$,

$\mu_{0,i} \neq \mu_{0,j}$, $\mu_{1,i} \neq \mu_{1,j}$, …, $\mu_{p,i} \neq \mu_{p,j}$,

$\beta_{1,i} \neq \beta_{1,j}$, …, $\beta_{p,i} \neq \beta_{p,j}$,

and

$\eta_{1,i} \neq \eta_{1,j}$, …, $\eta_{p,i} \neq \eta_{p,j}$

for all i and j. Bivariate regressions in Dumitrescu and Hurlin (2012) take the form,

$$y_{i,t} = \alpha_{0,i} + \sum_{p=1}^{k} \alpha_{p,i} y_{i,t-p} + \sum_{p=1}^{k} \beta_{p,i} x_{i,t-p} + \varepsilon_{i,t}$$

$$x_{i,t} = \mu_{0,i} + \sum_{p=1}^{k} \mu_{p,i} x_{i,t-p} + \sum_{p=1}^{k} \eta_{p,i} y_{i,t-p} + e_{i,t}$$

where, *t* denotes the time period dimension of the panel, and *i* denotes the cross-sectional dimension and *k* is the number of lags. This assumption is applicable for India contrary to the assumption where the panel is treated as one large stacked data set. The intention is to perform Granger causality regressions for each and every individual cross-sectional unit. Subsequently, take the average of the Wald statistics derived from each cross section to get the W-bar statistic.

RESULTS AND DISCUSSION

Table 2 presents the results of the Levin, Lin, Chu (LLC) unit root tests. The results indicate that both variables are stationary after first differencing. In other word, both variables are integrated of order (1). Hence, we can apply the procedure of Pedroni (1999) to look into the cointegration possibility between the focus variables. In this study, given the AIC criteria, an optimum lag of 2 has been considered.

The results in Table 3 designate the existence of a cointegrated relationship between health spending and per-capita economic growth in the long run. Under the alternative hypothesis, the panel-v statistic diverges to positive infinity (∞^+), and the right-hand tail of the standard normal distribution has been used to reject the null hypothesis. However, all the other panel cointegration test statistics diverge to negative infinity (∞^-). Therefore, the left-hand tail of the standard normal distribution is used to reject the null hypothesis. There is a strong evidence of panel cointegration as the test statistic values lie in the critical region (be it right-hand tail or left-hand tail) and the null hypothesis of 'no cointegration' gets resoundingly rejected.

This tests of whether GSDP and PHE follows a unit root process or not. At the level value, the approximate p-value for GSDP and PHE is 0.61 and 0.27 respectively. So, the null hypothesis of existence of unit root cannot be rejected. The next step is to carry out the first order differencing of the data and the results suggest that the both the GSDP and PHE series become stationary at the first order. The p-value of 0.00 implies that the null hypothesis of presence of unit root gets rejected. This helps in building up a model based on first order stationary data set. However, the presence of a cointegrating liaison does not give any clear idea regarding the causality between the concerned variables in this section. The results of the test for causality are reported in Table 4.

Table 2. LLC Unit Root Test Results

Variables	Level	Probability	1st Difference	Probability	Result
GSDP	0.37	0.61	-3.40	0.00*	I(1)
PHE	-0.63	0.27	-4.62	0.00*	I(1)

Notes: * denotes significance at 95 per cent level and calculation has been done by the author in Eviews-7

Table 3. Panel Cointegration test

Test Procedure	Test statistic	Probability Value	Result
Panel v-statistic	3.19	0.00*	Cointegration
Panel rho-statistic	-2.35	0.00*	Cointegration
Panel PP-statistic	-3.08	0.00*	Cointegration
Panel ADF-statistic	-2.90	0.00*	Cointegration
Group rho-statistic	-4.72	0.00*	Cointegration
Group PP-statistic	-2.77	0.00*	Cointegration
Group ADF-statistic	-8.11	0.00*	Cointegration

Notes: * denotes significance at 95 per cent level and calculation has been done by the author in Eviews-7

Table 4. Results of Panel Causality test

Null Hypothesis	W-Bar Statistic	Probability
PHE does not Granger Cause GSDP	3.23	0.00*
GSDP does not Granger Cause PHE	4.59	0.00*

Notes: * denotes significance at 95 per cent level and calculation has been done by the author in Eviews-7

The author has found only one cointegrating vector. From the theoretical framework proposed by the author to the model given by Halder and Mallik (2010), theoretically, there exist the presence cointegration. This is justified because if investment on public health rises, it is bound to create a repercussion effect on income growth in the long run. Consequently, the policy formulations at the federal level should take into account this liaison but what happens to this relationship at the state level has been left for further research and is worth exploring. The Wbar statistic for both cases lies in the critical borough as suggested by the p-value and the null hypothesis of 'PHE does not Granger Cause GSDP' and 'GSDP does not Granger Cause PHE' gets rejected. Therefore, there exists a bilateral causality running between GSDP and PHE which is in harmony with the results obtained in Hurd and Kapteyn (2003). The higher is the healthcare expenditure, better are the infrastructural facilities and as people are able to avail these facilities, the burden of disease falls. Thus, labourers become more productive and are capable enough to bring in more income. A rise in income in the subsequent periods leads to growth. In contrast, if economic growth rises it means that citizens are better off. This in turn means that the citizens will be capable enough to demand high quality health infrastructure which in turn will put pressure on the Government to increase healthcare expenditure. These arguments can be seen in light of a negative perspective also. If healthcare expenditure is at its minimal level, quality of health infrastructure will be poor and labour productivity will fall. The quality of the healthcare infrastructure is actually poor for many states across India (Refer to Table 7). Consequently, economic growth peters out (Refer to Figure 3). When economic growth is low, this means that people are not capable enough to earn more, so demand for quality healthcare services will be less. This justifies the fact that healthcare expenditure will also be less. As a result, the bidirectional causal relation is justified in the Indian context.

PUBLIC HEALTH INFRASTRUCTURE AND HEALTH EXPENDITURE IN INDIA

This section primarily aims at constructing the health infrastructure index across 23 major states in India. As already mentioned, the idea is explore the link between public health infrastructure and health expenditure given the fact that public healthcare expenditure is cointegrated with per-capita growth rate of the states. To construct the index, two terminal points have been considered *viz.* 2005-06 and 2014-15. After the index construction, the position of the states with respect to this index will be discussed in the light of per-capita health expenditure of the concerned states. Before moving onto the index construction, the methodology needs to be discussed in detail.

The Key Dimensions

This paper considers five dimensions on the basis of which the index will be constructed. These include:

1. Number of Sub-Centres (SC).
2. Number of Primary Health Centres (PHC).
3. Number of Community Health Centres (CHC).
4. Number of District Hospitals (DH).
5. Percentage of SCs, PHCs and CHCs adequately equipped with supply of drugs, attendants, nurses, etc. (ADQ).

Table 5. Results of VIF Test

Variables	VIF
(SC)	3.82
(PHC)	2.67
(CHC)	3.41
(DH)	1.39
(ADQ)	1.20
Mean Score VIF	2.49

Notes: Computed by the author in Stata 12

Coming to the problem of multicollinearity, the most widely-used marker for multicollinearity, is the variance inflation factor (VIF). It may be calculated for each predictor by performing a linear regression of that predictor on all the other predictors in the model (Table 5). VIF is defined as:

$$VIF = \frac{1}{1-R^2}$$

The rule of thumb is that VIFs over and above the value of 4 demand further investigation, while VIFs exceeding 10 gives an indication of severe multicollinearity and hence requires correction.

Each of the dimensions taken into account is assumed to be independent given that the value of VIF is below 4. One can include other indicators like number of beds, health assistants but these factors depend on the figures of SCs, PHCs, CHCs and the number of hospitals. Consequently, if these factors are included, the independence assumption will break down on account of very high correlation.

METHODOLOGY FOR CALCULATING THE INDEX

The following steps are to be followed for calculating the index.

Step 1: Normalizing the parameters

It is an aggregate index comprising of five parameters (already stated) so cannot be aggregated to derive the composite index as the parameters have different units of measurement.

As a result, each parameter is normalized by –

$$X_{iN} = \frac{\left(X_i - X_{\min}\right)}{\left(X_{\max} - X_{\min}\right)}$$

where, X_{iN} is the normalized value, X_{min} is the minimum value observed across the 23 states considered for some parameter, X_{max} is the maximum value observed across the 23 states for a particular parameter and X_i is the value a particular parameter for state i.

Normalization yields a value for every parameter for every state which lies between 0 and 1. The value '0' depicts the worst case and '1' depicts the best case scenario.

Step 2: Aggregation using the Weighted Euclidean Distance Method

Firstly, in this analysis the author has given equal weights to all the parameters given the fact that all the parameters are of equal importance in judging the quality of healthcare infrastructure. The five dimension-indices may be represented in a five-dimensional space with the value '0' being the minimum value and '1' as the ideally required value.

The Public Health Infrastructure Index (PHI) uses inverse of the weighted Euclidean distance from the ideal point of (1,1,1,1,1). So the PHI calculation for state i is given by:

$$PHI_i = 1 - \sqrt{\frac{\left[\left(1-SC_i\right)^2 + \left(1-PHC_i\right)^2 + \left(1-CHC_i\right)^2 + \left(1-DH_i\right)^2 + \left(1-ADQ_i\right)^2\right]}{5}}$$

The numerator of the term within the square root gives the Euclidean distance of state i from the ideal point (1,1,1,1,1). The inverse distance has been calculated to show that higher is the value of PHI, better will be the public health infrastructure and higher will be the position of the state concerned among other states. As proposed by Nathan et al. (2008), this PHI index satisfies the properties of *NAMPUS* i.e. normalization, anonymity, monotonicity, proximity, uniformity and signaling. Moreover, this framework relaxes the assumption of a perfect substitutability among the five-dimension indices signifying that a decent performance taking into account one specific dimension does not make up for the bad performance with respect to another dimension.

The results reported in Table 7 provide us with the PHI scores (rounded up to 3 decimal places) and ranks for the 23 states. Though, data is available from 1980 onwards, for comparison of the current inter-state performance, time points 2005-06 and 2014-15 have been taken into account. The trends in public healthcare expenditure from 2001 onwards have been reported in Figure 2. Public healthcare expenditure

Figure 2. Trends in Central Public Health Expenditure (as a percentage of GDP) in India

has more or less hovered between 1.1 to 1.4 per cent of GDP in the Indian context. Now, the question is to what extent this has impacted health infrastructure.

The real per-capita public health expenditure data in Table 7 has also been normalized based on the normalization criteria (value lies between 0 (min) and 1 (max)) in the previous sub-section.

Table 6. Pattern of central allocation (Total vs Healthcare) (crore INR)

Plan Period	Total Planned Investment	Family Welfare Allocation	Total for Health Sector
Eighth Plan (1992-97)	434100	6500 (1.5%)	14102.2 (3.2%)
Ninth Plan (1997-2002)	859200	15120.2 (1.76%)	35204.95 (4.09%)
Tenth Plan (2002-07)	1484131.3	27125 (1.83%)	58920.3 (3.97%)
Eleventh Plan (2007-12)	2156571	136147.0 (6.31%)	140135 (6.49%)

Source: Compiled from Planning Commission of India (2011)

Table 7. PHI Scores

State	PHI Score (2014-15)	PHI Score (2005-06)	Rank (2014-15)	Rank (2005-06)	Real Per-Capita PHE (2005-06)	Real Per-Capita PHE (2014-15)
Andhra Pradesh	0.351	0.332	9	9	0.41	0.34
Arunachal Pradesh	0.313	0.309	12	12	0.55	0.36
Assam	0.217	0.191	16	17	0.56	0.38
Bihar	0.151	0.148	20	21	0.43	0.00
Goa	0.534	0.487	2	4	0.47	0.42
Gujarat	0.328	0.311	11	11	0.59	0.69
Haryana	0.410	0.370	8	7	0.42	0.35
Himachal Pradesh	0.414	0.387	6	6	0.73	0.67
Karnataka	0.331	0.330	10	10	0.63	0.58
Kerala	0.561	0.509	1	2	0.79	0.67
Madhya Pradesh	0.274	0.254	14	14	0.44	0.51
Maharashtra	0.431	0.427	5	5	0.46	0.39
Manipur	0.157	0.151	19	20	0.28	0.27
Meghalaya	0.143	0.122	22	23	0.36	0.35
Nagaland	0.142	0.131	23	22	0.00	0.24
Orissa	0.234	0.196	15	16	0.50	0.37
Punjab	0.519	0.489	4	3	1.00	1.00
Rajasthan	0.196	0.215	17	15	0.51	0.37
Sikkim	0.149	0.156	21	19	0.42	0.31
Tamil Nadu	0.520	0.512	3	1	0.53	0.58
Tripura	0.176	0.174	18	18	0.39	0.24
Uttar Pradesh	0.304	0.296	13	13	0.34	0.44
West Bengal	0.411	0.365	7	8	0.36	0.29

Notes: Computed by the author

Table 8. Summary Statistics of PHI Scores of 2014-15 and 2005-06 – A Comparison

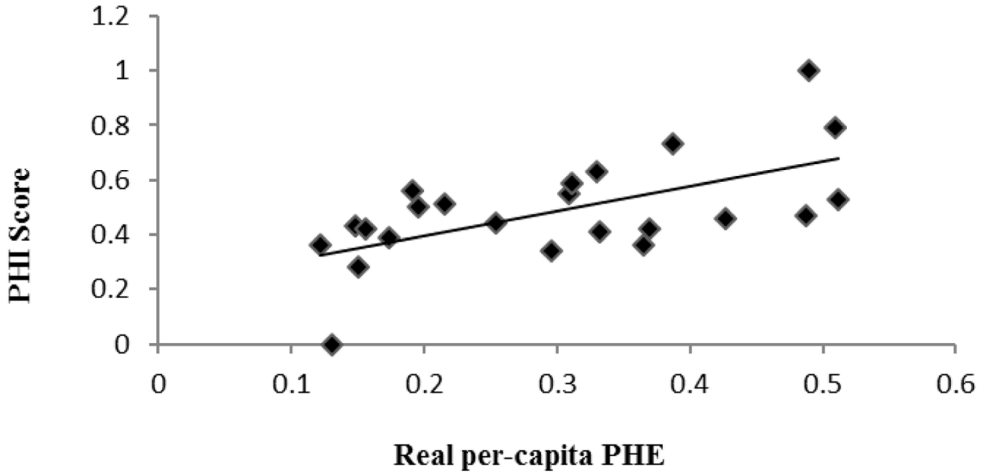
Observations	**23**	**PHI_Scr_14_15**	
Percentiles			
1%	0.142	Mean	0.31591
25%	0.176	Standard Deviation	0.13910
50%	0.313	Variance	0.01935
75%	0.414	Skewness	0.28569
99%	0.561	Kurtosis	1.83167
		PHI_Scr_05_06	
Percentiles			
1%	0.122	Mean	0.29835
25%	0.174	Standard Deviation	0.12940
50%	0.309	Variance	0.01675
75%	0.387	Skewness	0.25213
99%	0.512	Kurtosis	1.81361

Notes: Computed by the author in Stata 12

The results in Table 7 help us to judge the position of the states with respect to public healthcare infrastructure in light of real per-capita GSDP. Table 8 is an extension of Table 7 in the sense that it gives us an idea about the average values of public healthcare infrastructure in the country, measures of dispersion and other distributional features of the health infrastructure. Before going on to the explanation of Table 7, a snapshot analysis of Table 8 demonstrates that average value of the index hovers around 0.3 indicating that the overall position in terms of public healthcare infrastructure is not quite up to the mark. Between 2005-06 and 2014-15, there has not been any significant improvement in the health infrastructure index. The median value (50^{th} percentile) has remained almost the same at 0.31. The value of kurtosis less than implies that the distribution of the PHI Scores has too thick tails and flat in the middle i.e. platykurtic in nature. The percentile values show the percentage of states having PHI Scores at or below the corresponding partition value. It is appalling to observe that 99 per cent of the values for PHI Scores lie below 0.56 in 2004-05. The figure has further deteriorated to 0.51 as the maximum value of the PHI Score has worsened. The value of variance in 2005-06 is 0.016 and in 2014-15 it has been 0.019. This gives an indication that the estimates have been highly consistent and that the predicted values are very close to the observed ones. This also validates the absence of heteroskedasticity in the analysis. Another motivating feature is the measure of the skewness (i.e. positively skewed) which reflects that a majority of the states have performed disappointingly with regards to the public health infrastructure index.

Looking at Table 7, the top 5 performing states are Kerala, Punjab, Tamil Nadu, Maharashtra and Goa. As before, the position of Maharashtra has remained the same but the position of the other top performing states have changed but they have remained within the top 5 bracket. The highest score is 0.56, attained by Kerala, signifying that even the top performing state needs to improve a lot in terms of public health infrastructure development. Interestingly, the scores obtained by all the states have improved between this time span except for Rajasthan and Sikkim. For states like Goa and Maharashtra, in spite of spending somewhat less on real per-capita health, its position on the health infrastructure index is at the top

Figure 3. PHI scores and Real per-capita PHE Scatter plots for 2005-06

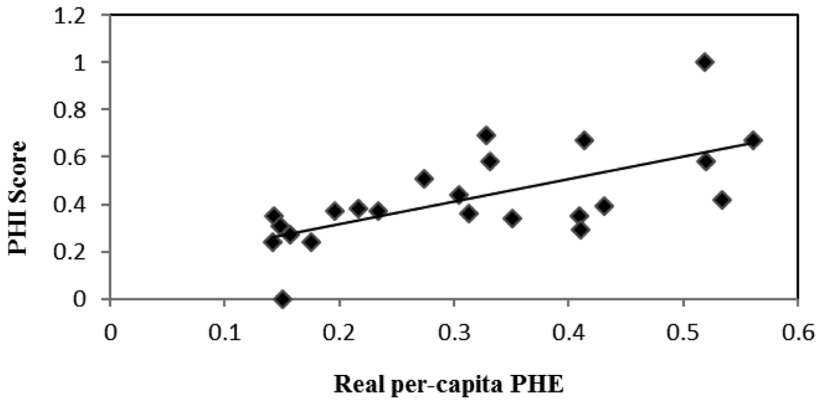


indicating that a majority of health expenditure has been incurred on development of health infrastructure. On the contrary, the position of states like Rajasthan, Karnataka and Arunachal Pradesh on the index is not consistent to per-capita health expenditure. This draws our attention to the fact that per-capita health expenditure has not been incurred on the development of public health infrastructure *per se*.

Coming down to the final part of the analysis, the relation between the normalized value of real per-capita spending and health infrastructure index has been explored in Figure 3 and 4. Due to lack of data points (since I have considered health infrastructure at two points *viz.* 2005-06 and 2014-15), it was not possible to carry out a panel data analysis. As an alternative, a scatter plot analysis has been carried out (Refer to Figure 3 and 4).

There are exceptions where in spite of increase in healthcare spending, infrastructure position has deteriorated but in general the relation is clearly positive indicating that the increase in real per-capita health expenditure indeed influences the health infrastructure of the state concerned. The relationship has more or less remained the same between the time periods considered.

Figure 4. PHI Scores and Real per-capita PHE Scatter plots for 2014-15



This issue of the triangular analysis of health expenditure, healthcare infrastructure and economic growth has cropped up on account of India's healthcare system primarily focusing on curative measures rather than preventive ones. Their focus has never been on health infrastructure *per se*. Therefore, both the central and the state governments have a critical role in the development of health infrastructure of the states concerned and the country in general. Figuring out the pattern of investments, sources of funding and proportion of allocation against the total allocation helps us to comprehend the health outcomes as regards to the healthcare expenditure. The data in Table 6 below table shows the percentage of allocation for the health sector alongside the total planned investment in the country by the centre. Figure 2 noticeably shows the decline in the total health sector allocation from 2001 onwards. It increased to some extent in the Eleventh Plan when the National Rural Health Mission (NRHM) schemes were started. There are several schemes under the umbrella of NRHM, which includes Facility Based Newborn and Child Care (FBNC), Janani Shishu Suraksha Karyakram (JSSK), Facility Based Integrated Management of Neonatal and Childhood Illness (F-IMNCI), Navjat Shishu Suraksha Karyakram (NSSK), etc but none of them are concerned with the development of healthcare infrastructure. Infrastructure development is a part of preventive measure which the Indian health sector has not yet been able to come to terms to. As per the Rural Health Statistics (RHS) reported on 31.3.2015, there is an acute shortfall of 33145 SCs (20%), 6556 PHCs (22%) and 2316 CHCs (32%) across the country.

Kerala's noticeable health indices are partially attributed to a health infrastructure developed by a government committed to healthcare. Even, that has started to collapse. This can be attributed to the poor condition of the public hospitals coupled with the private sector becoming the major source of curative healthcare in the rural and the urban areas. Precisely, in public hospitals, the administrators fight for funds and in this process many specialists switch to corporate hospitals where the incentives are much more. The economic cause of this resurgence of the private health sector is essentially the incentives they propose to the personnel concerned. This reduces public hospitals to sheer 'dumping grounds' for the unwanted cases. The question is that how can India maintain the growth prospects when the health infrastructure is in such a shambles? Interestingly, increase in real per-capita health expenditure does not always lead to a rise in the value of the infrastructure index. Health Infrastructure and per-capita spending on healthcare are more or less positively related except for a few cases so, given that health expenditure is related to economic growth so by the law of transitivity, public healthcare infrastructure indeed has a role to play in economic growth.

India has grown steadily in the last decade excluding the period of the global financial crisis i.e. (between 2009 and 2013). The results of this analysis clearly validate that health expenditure will motivate the dual benefits of health progress in particular and growth in general. The figures are a sign of the lackluster performance of the states in terms of the public healthcare infrastructure. Figure 3 shows that the states spending comparatively more on healthcare have scored high on the infrastructure index, *vice versa*. But, the states that are positioned at the top have not spent a significant amount so the question is that inspite of spending somewhat less how they have been able to maintain their position on the growth trajectory. This is the puzzle the paper talks about. The big players in the private healthcare sector like Narayana Hrudayalaya, Wockhardt, Fortis, MEDICA, Columbia Asia and others are making their presence increasingly felt across the states which in turn is pushing up the growth. Public healthcare infrastructure has taken a backseat with the private players taking their place. Actually, the private health sector is the missing link in this analysis.

CONCLUDING REMARKS AND FUTURE RESEARCH POSSIBILITIES

This paper shows that the North-Eastern states are the worst performers in terms of development of public healthcare infrastructure. Not only there is an acute shortage of health centres but also trained personnel including doctors, nurses, mid-wives and other health workers. In line with the "Look East" policy of the Government of India, various private healthcare providers are either setting up their amenities or formulating plans for exploiting the potential in the North-Eastern market. For example, only a few days back, Kolkata was the sole healthcare hub in Eastern India for catering to the requirements of the patients coming from all the North-Eastern states, Bihar, Orissa as well as from Bangladesh and Nepal. To lessen the burden on Kolkata and also for the purpose of decentralization of the health sector, recently three cities (*viz.* Asansol and Siliguri in West Bengal and Bhubaneswar in Odisha) have emerged as future healthcare hubs in the Eastern part of India. Given their performance, do the North-Eastern states have the potential to become the Mecca of healthcare on their own? It is my belief that the performance of the governments (at all levels) will go a long way in determining whether North East India gets to welcome the rising healthcare sun.

On the whole, India's public healthcare system is erratic, underfunded coupled with overcrowded hospitals and clinics, and lack of penetration in the rural areas. Cutting down on funding by the Government of India has been accredited for the celebrated failures on the part of the Ministry of Health and Family Welfare to use up its allocated budget wholly. Now, healthcare services are increasingly becoming unreachable because of the lack of government support and the growing penetration of private institutes in the medical sector. A question which warrants an immediate answer is concerned with the role of the current public healthcare system. Despite, the growth of public-private partnership (PPP) model, financial as well as logistical constraints still hinders the development of large scale undertakings under such a framework. The private sector is not only promising to be a major player in terms of service provision but is also trying to fill in the gaps left by the public sector. The speedy growth of the private health sector has resulted in a situation where these private players have become commercial units and the social-welfare goal has taken a backseat. This is of serious concern from the welfare perspective. Therefore, the twofold goals of both the centre and the state under such a situation should be to arrange for equitable access to healthcare services and preserving the standard of health infrastructure.

Summing up, this article has explored the causal liaison between real per-capita public healthcare expenditure and real per-capita GSDP growth across 23 major states in India over an interval of 35 years. It illustrates that the variables of interest are non-stationary, and that they are linked in the long run. The results reject the null hypothesis of 'no cointegration' in the panel cointegration test. Moreover, the "health-led growth hypothesis" gets validated in this study. Moving onto the health infrastructure index section, the calculation shows a positive relationship between health infrastructure position and health expenditure across the states in India. The variability in the index reveals the fallacy in the "one-size-fits-all" strategy which is followed for allocating funds across the states. Here, the focus is primarily on health so incorporating education expenditure as a percentage of GSDP would put in another dimension to this subject. Likewise, any researcher can use this framework to construct an educational infrastructure index. Hence, the impact of healthcare spending on economic growth coupled with the implications for health infrastructure endorses the requirement for governments' intervention. This can be productively carried out by implementing policies designed to develop a healthier and a productive India.

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KEY TERMS AND DEFINITIONS

Cointegration: Cointegration is an econometric characteristic where a collection of time series variables (X_1, X_2, X_3, ….. X_k) being integrated of the same order (greater than zero i.e. non- stationary) can be combined to generate a linear combination from this collection of variables which is integrated of order zero (i.e. a stationary trend). Then the time series variables X_1, X_2, X_3, ….. X_k are said to be cointegrated.

Difference Equations: When time is permitted to take integer values only, the pattern of change of a variable say x, is described by the so-called 'differences' between the two consecutive time periods. In notational terms, the difference is characterized as: $\Delta y_t = y_{t+1} - y_t$ and a difference equation of the first order is like: $y_{t+1} - y_t = 2$.

Economic Growth: It can be defined as the increase in the capability of an economy to produce goods and services from one period to another. It can be measured either in nominal terms or in inflation adjusted real terms. Typically, GDP or GNP is taken as a measure of economic growth. In notational terms, GDP growth rate, g_t, $g_t = \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}} \times 100$ where, *t* indicates the particular time point.

Euclidean Distance Function: The Euclidean Distance in Euclidean-n space is the distance (dist) between two vectors **a**, $a = (a_1, a_2, \ldots a_n)$ and **b**, $b = (b_1, b_2, \ldots b_n)$ is given by

$$dist(a,b) = dist(b,a) = \sqrt{\left(a_1 - b_1\right)^2 + \left(a_2 - b_2\right)^2 + \ldots\ldots \left(a_n - b_n\right)^2}$$

Granger Causality: Granger Causality is a statistical hypothesis that asserts that a time series variable say X, is said to "Granger cause" another time series variable Y, if and only if the past values of X contain adequate information to predict Y.

Panel Data: Also called longitudinal data, represents cross-sectional time series data i.e. data on multi-dimensional cross-sections (comprising of individuals, firms and countries) over a period of time.

Public Health Infrastructure: This can be explained by the following: (i) A competent public healthcare workforce; (ii) Up to-date data and information systems; (iii) Evaluation of the machinery (consisting of health centres, doctors, nurses, attendants etc.), effectiveness, accessibility and quality of public health services.

Public Healthcare Expenditure: It includes public healthcare expenditures covering the entire gamut of provision of healthcare services (preventive and curative), family planning measures, nutritional requirements, reproductive and child health (RCH) and other problems pertaining to emergency aid in this arena.

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Chapter 9
Health Infrastructure and Economic Growth in Sub-Saharan Africa

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ABSTRACT

In this study, we examine the effect of health infrastructure on economic growth in 30 Sub-Saharan Africa (SSA) countries over the period 1990-2014. Using modern econometric techniques that account for cross-sectional dependence in panel data, we find that health infrastructure (measured by mortality rate) does not have robust impact on economic growth. Gross fixed capital formation, however, is positively associated with economic growth while labor force and polity variables exhibit significant association with economic growth. The results provide sufficient evidence that although capital investment is adequate, the labor force and political environment have not facilitated the health infrastructure in increasing the GDP per capita level in SSA.

INTRODUCTION

For more than three decades, many Sub-Saharan African economies have experienced stunted life expectancy as a result of rampant communicable and parasitical diseases (The Economist Intelligence Unit, 2012). These low life expectancies have further been worsened by the inability of several communities in Africa to provide portable drinking water, good sanitation and inadequate nutrition. Coupled with these problems are the lack of adequate financing for the improvement and expansion of health care infrastructure in the region. According to the International Finance Corporation (IFC) (2007), although

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Sub-Saharan Africa (SSA) constitutes 11% of the world population, it accounts for 24% of the global disease burden. Further, the report notes that the region commands less than 1% of the global health expenditure creating a huge finance deficit in healthcare infrastructure and delivery. The result is that the region has not been able to achieve the Millennium Development Goals (MDGs) and the Abuja declaration.

Infant mortality rate per 1000 live births in 1960 was very high (160) in SSA compared to Latin America and East Asia which recorded 103 and133 respectively. Adult mortality rates per 1000 persons (male) that same year for SSA (547)was higher than Latin America (304) and a bit lower than East Africa (650).Total life expectancy at birth, in the 60's for SSA was 41 years while East Asia and Latin America stood at 39 years and 56 years respectively. By 2015, infant mortality rate per 1000 live births in SSA stood at 56.3 while Latin America and East Asia reduced drastically to 15.9 and 14.9 respectively. Concerning adult mortality rates per 1000,SSA documented 333 in 2013 while East Asia and Latin America documented 135 and 181 respectively. Turning to total life expectancy at birth, SSA improved to about 58 years in 2013 whereas Latin America and East Asia improved to 74 and 73 years respectively[1].Similarly, health expenditure, hospital beds and physician density have been relatively low in the region compared to other regions (see Appendix 1); Liberia had physician density (i.e. physicians per 1000 population) of 0.01 and South Africa had 0.78 in South Africa whiles advanced economies such as Switzerland and United Kingdom had 4.05 and 2.81 correspondingly. These deteriorating health indicators amidst the region's quest for improved economic conditions makes this study interesting case for empirical examination. Consequently, the World Bank's Global Economic Prospects (2015) report note that economic growth has been fairly constant in the region. The question then is whether the declining health indicators are linked to economic growth. Equally important is the effects of declining health indicators in SSA relative to global indicators on economic growth.

It is worth mentioning that amidst these poor conditions, however, some African countries have made remarkable strides; For example, Ghana, Rwanda and South Africa have established a health coverage system which promises universal health coverage. Nonetheless, life expectancy continues to increase steadily each year in OECD countries. Life expectancy at birth averaged 80.5 years in 2013, an increase of over ten years since 1970 (OECD, 2016). According to the OECD (2016) report OECD nations such as Japan, Spain and Switzerland have life expectancy above 80 years. This is not surprising because there are more than two specialist doctors for every generalist on average across the OECD. Likewise, student enrolment into domestic nursing and medical schools have increased substantially over the past two decades.

Generally, a good health infrastructure is crucial to economic development. Theoretically, a good health infrastructure is known to increase human capital levels as well as economic productivity of individuals in a country. Additionally, a good health infrastructure helps improve education levels by increasing the levels of schooling and scholastic performance. This affects economic growth by raising income levels and also decreasing poverty levels, ceteris paribus. This study measures health infrastructure with the number of infant deaths and the number of deaths under-five. The underlining logic behind the use of these measures is that good health infrastructure equates to low number of infant deaths in the region whereas high number of infant death denote a poor health infrastructure.

Many studies have examined health and economic growth but usually pertaining to developed economies. On the whole it is found that health is positively related to economic growth. For instance, Bloom, Canning, and Sevilla (2004) find that good health has a positive effect on aggregate output after controlling workforce experience. Gong, Li and Wang (2012) conclude that economic growth is related

to both the health growth rate and the health level. Further, the authors find that while growth in health capital always facilitates economic growth, the gross effect of health level on the rate of economic growth is contingent on physical capital accumulation. On the contrary, Ashraf, Lester and Weil (2008) demonstrate that the effects of health improvements (measured by life expectancy and prevalence of malaria and tuberculosis) on income per capita are substantially lower than those that are often quoted by policy-makers. In SSA, Gyimah-Brempong and Wilson (2004) find a positive quadratic relationship between growth rate per capita and health human investment capital after controlling for endogeneity bias.

We contribute to the literature by using recently developed panel models that account for heterogeneity in the estimation of the slope coefficient and cross-sectional dependence to investigate the relationship between health infrastructure and economic growth in Sub-Saharan Africa from 1990 to 2014. Specifically, the mean group (MG) estimator of Pesaran and Smith (1995), Pesaran's (2006) Common Correlated Effects Mean Group (CCEMG) estimator and Eberhardt and Teal (2010)'s Augmented Mean group (AMG) estimators are used. Moreover, our model captures the political economy environment of various countries in SSA over the period 1970 to 2015 by measuring their regime type.

LITERATURE REVIEW

The ultimate goal of an effective health infrastructure in every country is improvement in the health status of the population (Organization for Economic Cooperation and Development (OECD), 2015; Bloom and Canning, 2008). Such improvements are measured by various quality care indicators (Kelley & Hurst, 2006). Key determinants of health infrastructure consist of internal and external indicators not limited to physical environment in which people live but also individual lifestyle and behaviours (World Health Organization (WHO), 2012; OECD, 2015).

For the purpose of this theoretical and empirical review of the health infrastructure-growth nexus, we define Infrastructures as "the basic services or social capital of a country, or part of it, which make economic and social activities possible" (Rutherford, 2002). The elements of public health infrastructure that tend to be easiest to recognise and to describe are those concerned with areas such as communicable disease control (including the safety of food), the protection of the health of mothers and children and the control of environmental contamination (Powles & Comim, 2003).

Theoretically, the neoclassical and endogenous growth theories provide a framework for an insight into the health infrastructure-growth nexus. Neoclassical growth theory pioneered by Solow (1956) assumes that output is a function of capital, labour and technical knowledge. Besides, these factors are assumed to be inputs just similar to raw materials for production and therefore not considered very important per the neoclassical growth model. The key assumption of the Solow (1956) model is that technology is free; it is publicly available as a non-excludable, non-rival good. Capital accumulation is deemed as the key determinants of growth per the neoclassical growth theory. However, the shortcomings of this model especially applying to the US economy led to the identification of omitted variables. Subsequently other growth variables were identified other than physical capital resulting in the human capital theory (Shultz, 1959).

In contrast, the endogenous growth model assumes that human capital (e.g. health and education), innovation and knowledge are the key drivers of growth (Romer, 1986; Lucas, 1988). Furthermore, the endogenous growth theory assumes a production function that exhibits non-decreasing returns to

scale, i.e., constant or increasing returns, (Romer, 1986). This is because human capital improvement is catalytic to an efficient and effective resource use occasioned by technology, research and development.

Empirically, the growth-enhancing effects of health have been investigated by a number of researchers. For instance, Bloom, Canning and Sevilla (2004), Gyimah-Brempong and Wilson (2004), Jamison, Lau and Wang (2005), and Weil (2007) assert that good health systems improve human welfare as well as labor productivity, and positively affects economic growth in both developing and industrial countries. Additionally, some researches (Zhang, Zhang, & Lee, 2003; Miguel & Kremer, 2004;Soares, 2006; Jayachandran &Lleras-Muney, 2009) have sought to explain that longer life expectancy as a result of improved health conditions increases the propensity to save and become more productive, reflecting growth-enhancing effect. Bloom and Canning (2003) indicates four channels of positive effects of quality healthcare on growth; (1) increased productivity earns higher incomes, (2) spend more time in the labour force, (3) enhanced educational investment that increases their productivity and (4) save more.

Still focusing on the growth-enhancing effect of health infrastructure, Bhargava, Jamison, Lau and Murray (2001) adopted a panel data approach and studied the effects of health indicators, such as adult survival rates on GDP growth rates at 5-year intervals for a number of countries. The authors find that adult survival rates have a positive impact on GDP growth rates in low-income countries. Earlier, Rivera and Currais (1999) used an extended version of the Solow model and a log-linear equation which is estimated using Ordinary Least Square (OLS) for OECD countries over the period 1960-1990. The results support the fact that health has a positive impact on economic growth. Alsan, Bloom, Canning and Jamison, (2006) examine economic growth rates over the period 1960–2000 for countries grouped by initial income and life expectancy. The authors find health to be a significant predictor of economic growth. This particular study confirm earlier studies that the initial levels of population health are a significant predictor of future economic growth (Bloom, Canning, & Sevilla, 2004)

Gyimah-Brempong and Wilson (2004) find that investment in health and the stock of health capital have a positive and significant effect on growth of per capita income. The authors conclude that investment in health increases economic growth in the short run. Furthermore, the investment in health increases the per capita income of individuals in the long run arising from increase in stock of human capital. Interestingly, the findings from Acemoglu and Johnson (2007) suggest that improvement in health conditions reduces per capita income or GDP. The authors premise their argument on growth in population exceeding GDP growth which contrasts Gyimah-Brempong and Wilson (2004).

Another revelation in literature is the role of moderating variables that influence the health-growth nexus. Cooray (2013) using both Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM), examine the differential effects of health on economic growth for a sample of 210 countries using panel data over the period 1990-2008. The author's findings show absence of robust relationship between health capital and economic growth in the long-run unless through an interaction effects of health expenditure and education. Similarly, Tang (2013) examined the relationship between health care spending, economic growth, relative prices and life expectancy in Malaysia for the period 1970 to 2010 using cointegration test proposed by Bayer and Hanck (2013). The author concludes that health care expenditure does not stimulate economic growth directly but through its impact on improved health status as reflected by the life expectancy.

With respect to the growth-decreasing effects of health studies, numerous studies have been conducted indicating the negative impact of poor health systems on growth. For example, UNAIDS (2004), United Nations (UN) (2005), McDonald and Roberts (2006), and WHO (2007), have documented the negative effects of particular diseases such as malaria, HIV/AIDS and influenza pandemic which is the case

especially in low-income countries. Likewise, poor nutrition or malnutrition, inadequate consumption of protein, energy and vitamin, smoking, and drinking, inter-linked to child and adult mortality, may cause poor health, which results in low level of labor productivity and shortens life expectancy, and therefore have an adverse, indirect effect on economic growth (see Strauss & Thomas, 1998; Wang & Taniguchi, 2003; Hoddinott, Alderman, & Behrman, 2005; Jensen & Lleras-Muney, 2012). Arora (2001) also admit that poor health, as seen in high rate of disease prevalence and deaths, is the major cause of poor growth in developing countries. Similar findings from Lorentzen, McMillan and Wacziarg, (2008) provide evidence that high mortality rate reduce the size of the labour force thus negatively affecting economic growth.

In a recent study in Nigeria, Usman, Muktarb and Inuwaa (2015) examined the long run relationship between health outcomes and economic growth in Nigeria for the period 1961 to 2012.Using annual time series data, the authors conducted Augmented Dickey-Fuller (ADF) test to check the stochastic properties of the variables. Also, Johansen Multivariate Cointegration approach and Vector Error Correction Mechanism (VECM) were applied to check the long run and short run dynamics respectively. Additionally, Granger causality test is employed to examine the direction of causality among the variables. The authors find that health outcomes (life expectancy and crude death rate) in the long run negatively and significantly affect economic growth rate.

On the issue of causality, numerous studies conclude that there is a bi-directional causality in the health-growth nexus. However, the verdict from other research works indicates uni-directional causality. Usman, Muktarb and Inuwaa (2015) examining the health outcomes and growth in Nigeria finds the existence of uni-directional causality running from life expectancy and crude death rate to economic growth. Sen, Kaya, and Alpaslan (2015) analysing the possible existence of Granger causality among three variables; education expenditure, health expenditure, and economic growth for the selected eight developing countries over the period 1995-2012 find a uni-directional causality from health expenditure to growth in Indonesia. Tang (2013) also finds a uni-directional causality running from life expectancy to economic growth.

Bloom and Canning (2008) assert the existence of two way causality between the health-growth nexus because health is partly due to income. Preston (1975) demonstrated a positive correlation between national income levels and life expectancy. Therefore, Bloom and Canning (2008) using recent data with the adoption of the "Preston Curve", conclude that higher income levels allow greater access to inputs that improve health, such as food, clean water and sanitation, education, and medical care. The outbreak and negative impact of Ebola clearly depicts the state of health infrastructure in SSA. According to Dalberg (2014),the Ebola outbreak exposed deep vulnerabilities and disparities in the health systems of the hardest-hit West African countries. Earlier, KPMG (2012) notes that Africa is not a healthy continent with the reason that examining all indicators of health, Africa lags behind the rest of the world, and behind poor countries of South-East and South Asia that were behind Africa when measured on these metrics a few decades ago. Widespread and rapacious corruption, health budgets gone missing, infrastructure problems, have made it difficult to provide services to many people in more remote areas (KPMG, 2012). Healthcare delivery infrastructure is insufficient; skilled healthcare workers and crucial medicines are in short supply; and poor procurement and distribution systems are leading to unequal access to treatment resulting in high out-of-pocket burden on individuals (WHO, 2011; The Economic Intelligent Unit (EIU), 2012). In addition to these difficulties, the EIU (2012) notes that public spending on health is insufficient, and international donor funding is becoming uncertain in the current global economic climate. The net effect is that in the absence of public health coverage, the poor have little or no

access to care including lack of access to the fundamental prerequisites of health: clean water, sanitation and adequate nutrition. Interestingly, Sub-Saharan Africa makes up 11% of the world's population but accounts for 24% of the global disease burden and regrettably commands less than 1% of global health expenditure (EIU, 2012). In spite of this current state of health infrastructure in SSA, pragmatic efforts made in certain specific areas of intervention will ensure an improvement in the health of the population.

In summary, literature indicates both bi-directional and uni-directional causality in the health-growth nexus. Moreover some studies shows that direct effect of health on growth occur through moderating variables such as education and life expectancy.

OBJECTIVE OF THE CHAPTER

The objective of the present chapter is to examine the effect of health infrastructure on economic growth over the period 1990-2014 for a cross section of 30 Sub-Saharan African (SSA) countries.

DATA AND METHODOLOGY

Due to the ambiguities associated with first generation econometric techniques, we resort to panel heterogeneous techniques in explaining the association between health infrastructure and economic growth. Typically, we rely on the conventional neo-classical one-sector aggregate production framework in demonstrating this association. To obviate the inconsistencies associated with growth theories we adopt a conservative approach by treating capital, labour and health infrastructure as distinct factors of production given as;

$$Y_{it} = f(K_{it}, L_{it}, H_{it}) \tag{1}$$

Where the subscript i and t denote country and time (years) respectively; Y is output or real GDP; K is real gross capital formation as a proxy of capital stock, and H is health infrastructure. Taking the natural log of (1) we obtain:

$$\ln Y_{it} = \beta_i + \beta_{1i} \ln K_{it} + \beta_{2i} \ln L_{it} + \beta_{3i} \ln H_{it} + \varepsilon_{it} \tag{2}$$

β_i and ε_{it} in specification (2) represent country specific effects and random error (which allows the inclusion of other variables) respectively. Augmenting Equation (2) with our political economy variable (to capture moderation effect) we obtain:

$$\ln Y_{it} = \beta_i + \beta_{1i} \ln K_{it} + \beta_{2i} \ln L_{it} + \beta_{3i} \ln H_{it} + \beta_{4i} POL_{it} + \beta_{5i} \ln H_{it} * POL_{it} + \varepsilon_{it} \tag{3}$$

Recent developments in econometrics involve estimating panel models with heterogeneous slopes (with large cross-section and time series component). In this study our panel data is subjected to two main techniques; Pesaran's (2006) Common Correlated Effects Mean Group (CCEMG) estimator and Eberhardt and Teal (2010)'s Augmented Mean group (AMG) estimator.

The CCEMG is known for its ability to model heterogeneity by augmenting group-specific regression equation. This process involves the inclusion of the cross-section averages of dependent and independent variables as a means of accounting for unobserved common factors (see Eberhardt, 2012). Similarly, the AMG method averages the group-specific parameters across panel. However, unobservable common factors in the AMG approach are treated as a common dynamic process. Advantages of the CCEMG include robustness to structural breaks and spill over effects. Both the CCEMG and AMG methods perform well in the presence of cross-sectional dependence and in non stationary panel setting. We employ the MG estimator, which are affected by cross-sectional dependency to enable us to compare our results to previous studies.

The data is sourced from the World Bank's World Development Indicators [WDI] (2016) and Polity IV database over the period 1990 to 2014 for 30 Sub-Saharan African (SSA) countries. To achieve a stationary variance, we take natural logarithms of all variables except the political economy variable which takes on negative values at some instances. Real GDP (ln Y_{it}) and real gross fixed capital formation (ln K_{it}) are in constant US dollars (2005=100). Labor (ln L_{it}) is the total Labor force and Health infrastructure (ln H_{it}) constitute two measures; (1) Mortality rate, infant (per 1,000 live births) and (2) Mortality rate, under-5 (per 1,000). Polity2 (POL_{it}) captures democratic nature of the government (i.e. our political economy variable). Polity2 varies from -10 to 10, with negative scores are associated with autocracy and positive scores indicate democratic government which allows for fair elections and political freedoms for its citizens. The interaction variable (ln H_{it}*POL_{it}) captures the complementary or the substitution effect of polity2. All the variables are from the WDI except Polity2 which was obtained from the PolityIV[2] database. It is worth mentioning that the time period of 1990 to 2014 was chosen due to outburst of democratization in Africa in the 90's (Ndulu & O'Connell, 1999; Hall & Jones, 1999; Rodrik & Wacziarg, 2005). Consequently, the use of panel data results in 750 (30*25) or 715 (attributable to our Polity2 variable which covers the period of 1990 to 2013) observations.

Table 1 presents the average annual growth of each variable for the 30 SSA economies. The differences in the statistics presented reflect the degree of heterogeneity across the countries. The annual average growth rate in GDP (income) per capita ranges from a high of 8.883 (Gabon) to a low of 5.123 (Liberia), with a sample average of 6.609.South Africa documents the highest share in capital (24.355) while Gambia has the lowest (18.752). Concerning Labor, Nigeria has the highest (17.521) while Equatorial Guinea has the lowest (12.570). The mean of mortality rate, infant (per 1,000 live births) ranges from a high of 4.871 (Sierra Leone) to a low of 2.750 (Mauritius). Equally, Sierra Leone experiences the highest mortality rate, under-5 per 1,000 (5.337) and Mauritius the lowest (2.882). There was wide variation in the mean of polity2 variable, precisely the mean (0.523) ranges from a high of 10 (Mauritius) to a low of -9.125 (Swaziland). In other words, Mauritius is more democratic than Swaziland over the period of 1990 to 2013.

Correlations are presented in Table 2. The highest correlation in the sample is between the health indicators (mortality rates) (0.985). This informs us to use health indicators in separate regression equations to avoid multicollinearity, which usually inflates t-statistics giving rise to biased estimates. Health indicators, however, were negatively correlated with GDP per capita (-0.561 and -0.576). This indicates a possible negative association between health indicators and income per capita.

Further, we investigate the time series properties of our variables by subjecting them to Pesaran's (2004) cross-sectional dependence test (CD test) and unit root test (Cross-sectional IPS test) that accounts for cross-sectional correlation. As can be seen from Table 3, CD test rejects the null hypothesis

Table 1. Average annual growth rates

Country	lnY	lnK	lnL	lnH	lnH2	POL
Benin	6.347	20.673	14.904	4.435	4.909	6.083
Botswana	8.522	21.522	13.632	3.815	4.165	7.708
Burkina Faso	5.915	20.598	15.518	4.463	5.062	-2.167
Cameroon	6.797	21.677	15.665	4.381	4.856	-4.333
Congo, DR	5.551	21.027	16.803	4.606	4.984	1.333
Congo, Rep	7.463	20.949	14.075	4.064	4.482	-2.542
Equatorial Guinea	8.332	21.220	12.570	4.580	4.944	-5.250
Eritrea	5.535	18.997	14.379	4.006	4.412	-6.619
Gabon	8.883	21.486	13.052	3.931	4.345	-2.625
Gambia	6.063	18.752	13.214	4.114	4.699	-3.042
Kenya	6.299	21.916	16.337	4.035	4.473	1.958
Lesotho	6.536	19.998	13.575	4.366	4.657	5.292
Liberia	5.123	18.908	13.820	4.643	5.007	2.375
Madagascar	5.639	20.672	15.900	4.120	4.544	5.625
Malawi	5.409	20.618	15.457	4.445	4.942	3.333
Mali	5.983	20.446	15.061	4.643	5.232	5.542
Mauritania	6.556	19.910	13.637	4.303	4.679	-4.583
Mauritius	8.455	20.981	13.170	2.750	2.882	10.000
Mozambique	5.727	20.698	15.999	4.628	5.015	3.083
Namibia	8.133	20.998	13.405	3.790	4.187	6.000
Nigeria	6.555	22.905	17.521	4.623	5.121	0.500
Rwanda	5.613	19.650	15.196	4.333	4.822	-4.667
Senegal	6.584	21.277	15.289	4.081	4.624	3.958
Sierra Leone	5.812	18.815	14.348	4.871	5.337	1.625
South Africa	8.568	24.355	16.584	3.843	4.147	8.500
Sudan	6.443	21.937	15.974	4.156	4.591	-5.727
Swaziland	7.719	19.758	12.738	4.221	4.607	-9.125
Tanzania	6.022	22.035	16.686	4.195	4.647	-1.917
Togo	5.977	19.597	14.636	4.270	4.722	-2.792
Uganda	5.699	21.227	16.161	4.301	4.774	-3.250
Full Sample	6.609	20.787	14.844	4.234	4.662	0.523

of no cross-sectional correlation in all the variables. Additionally, CIPS test demonstrates that only two variables (ln Y_{it}, ln K_{it}) are stationary at first difference and the rest are stationary at levels.

Our MG, CCEMG and AMG specifications (models) are presented in Tables 4, 5 and 6 respectively. Each model is distinguished by health indicators, polity2 and interaction variable. For instance, MG [1] represents the base model without mortality rate, infant (per 1,000 live births), MG [2] represent base model (i.e. Equation 1 with mortality rate, infant (per 1,000 live births) and MG [3] includes interaction

Table 2. Correlation Matrix

	lnY	lnK	lnL	lnH	lnH2	POL
lnY	1.000					
lnK	0.487	1.000				
lnL	-0.425	0.515	1.000			
lnH	-0.561	-0.333	0.185	1.000		
lnH2	-0.576	-0.336	0.206	0.985	1.000	
POL	0.166	0.286	0.131	-0.316	-0.332	1.000

Table 3. Cross-sectional dependence and unit root test

Variables	lnY	lnK	lnL	lnH	lnH2	POL
Pesaran CD test	50.152	58.193	101.768	87.161	83.605	20.487
p-value	0.000	0.000	0.000	0.000	0.000	0.000
CIPS (Accounts for Cross-Sectional Dependence)						
Level	-1.862	-1.934	-1.711	-1.412	-1.328	-1.661
1st Difference	2.954***	-2.635*	-2.112	-1.926	-1.551	-2.013

Note: ***, **,* denote significance at 1%, 5% and 10% respectively

Table 4. Mean group (MG) Heterogeneous estimates

Dep: lnY	MG[1]	MG[2]	MG[3]	MG[4]	MG[5]	MG[6]
lnK	0.080***	0.076***	0.073***	0.083***	0.080***	0.073***
	(0.027)	(0.025)	(0.024)	(0.026)	(0.025)	(0.023)
lnL	-0.559	-0.581	-0.507	-0.569*	-0.465	-0.881
	(0.444)	(0.455)	(0.456)	(0.328)	(0.291)	(0.451)
lnH	-0.512	-0.478***	-0.221			
	(0.177)	(0.183)	(0.372)			
lnH2				-0.222**	-0.208***	-0.006
				(0.102)	(0.102)	(0.298)
POL		0.001	0.176*		0.001	0.193**
		(0.011)	(0.099)		(0.014)	(0.098)
lnH*POL			-0.017			
			(0.022)			
lnH2*POL						-0.041*
						(0.022)
_cons	15.540**	15.582***	12.586**	14.740***	15.186***	15.843***
	(6.676)	(5.640)	(5.202)	(4.784)	(4.174)	(5.055)
RMSE	0.040	0.038	0.036	0.041	0.039	0.037
Obs	750	715	715	750	715	715
Wald Test	19.08***	19.04***	16.44***	17.71**	17.49***	20.22***
CD Test	6.156***	4.208***	2.433**	6.089***	3.860***	2.196**

***, **,* denote significance at 1%, 5% and 10% respectively

variable (i.e. between mortality rate, infant (per 1,000 live births) and polity2). Afterwards, we replicate the order of specifications MG [1], MG [2] and MG [3] for MG [4], MG [5] and MG [6] using mortality rate, under-5 (per 1,000) as health indicator. The same applies to CCEMG and AMG models.

The estimated coefficients of capital (ln K_{it}) range between 0.07 and 0.09. They are statistically significant at the specified levels (1%, 5% and 10%). Second, labor(ln L_{it}) exhibit negative elasticities but are not significant throughout the regression specifications (Table 4). Coefficients of health infrastructure provide mixed results. All but one specification are negative. Three out of the six MG specifications have negative coefficients statistically significant at 1% (see MG [2], MG[3] and MG[5]). Polity coefficients and interaction variables are mixed throughout all the regressions. Afterwards, we test the residuals for cross-sectional dependence using the Pesaran (2004) CD test. Results from CD test indicate that MG specifications are plunged with cross-sectional dependence. On the contrary, Wald test indicate a good model fit.

As a result of issues related to specifications in Table 4, we implement CCEMG and AMG (see Tables 5 and 6) which perform well under cross-sectional dependence. Results from Table 5 and 6, confirm that capital is an important determinant of economic growth. The coefficients are statistically significant at 1% and range between 0.05 and 0.07 (See Table 5).

Table 5. Common Correlated Effects Mean Group (CCEMG) Heterogeneous estimates

Dep: lnY	CCEMG[1]	CCEMG[2]	CCEMG[3]	CCEMG[4]	CCEMG[5]	CCEMG[6]
lnK	0.065***	0.053**	0.051**	0.061***	0.058**	0.064***
	(0.021)	(0.025)	(0.023)	(0.022)	(0.023)	(0.022)
lnL	-0.105	0.504	1.083	-0.321	0.428	0.638
	(0.865)	(0.739)	(1.211)	(0.798)	(0.583)	(0.978)
lnH	0.299	-0.014	4.096			
	(1.064)	(0.894)	(3.893)			
lnH2				0.100	-0.074	2.795
				(0.712)	(0.437)	(2.607)
POL		0.005	-2.578		0.004	-2.163
		(0.006)	(2.640)		(0.005)	(2.028)
lnH*POL			0.530			
			(0.552)			
lnH2*POL						0.414
						(0.392)
_cons	-4.932	-4.293	-29.828	-2.316	-3.314	-24.580
	(19.825)	(16.095)	(37.075)	(16.856)	(12.053)	(28.981)
RMSE	0.030	0.028	0.024	0.029	0.028	0.025
Obs	750	715	715	750	715	715
Wald Test	10.32*	8.04*	10.56*	8.57**	11.55**	12.46**
CD Test	0.238	-0.671	-1.003	0.914	-0.441	-0.500

***, **,* denote significance at 1%, 5% and 10% respectively

Similarly, the AMG specification indicates the capital coefficients are significant at specified levels and range between 0.07 and 0.08 (See Table 6). Labor, Health infrastructure, polity and interaction variable are not robust in all both CCEMG and AMG specifications. Pesaran (2004) CD test indicate absence of cross-sectional dependence with RMSE (root mean square error) values lower than MG specifications in both CCEMG and AMG specifications. Accordingly, the lower the RMSE value the better the model. Thus, CCEMG and AMG models are preferred. Overall, our results add to the literature that emphasize the importance of health or health infrastructure on economic growth (Gyimah-Brempong & Wilson, 2004; Cooray, 2013; Rivera & Currais, 1999; Jamison, Lau, & Wang; Weil, 2007) and further, corrects problems associated with heterogeneity in previous panel studies.

CONCLUSION

We examine the effect of health infrastructure on economic growth in Sub-Saharan Africa (SSA). Using modern econometric techniques that account for cross-sectional dependence in our panel data, we find that health infrastructure (measured by mortality rate) does not have robust impact on economic growth. Gross fixed capital formation (gfcf), however, is positively associated with economic growth while labor

Table 6. Augmented Mean Group (AMG) Heterogeneous estimates

Dep: lnY	AMG[1]	AMG[2]	AMG[3]	AMG[4]	AMG[5]	AMG[6]
lnK	0.081***	0.076***	0.076***	0.076***	0.073*	0.070*
	(0.021)	(0.021)	(0.020)	(0.021)	(0.021)	(0.020)
lnL	0.142	0.053	-0.133	-0.088	-0.140	-0.116
	(0.836)	(0.770)	(0.864)	(0.840)	(0.748)	(0.812)
lnH	0.443	0.417	1.851			
	(1.201)	(1.089)	(1.797)			
lnH2				-0.357	0.351	1.277
				(0.955)	(0.842)	(1.351)
POL		0.001	-0.861		0.001	-0.811
		(0.003)	(0.840)		(0.003)	(0.665
lnH*POL			0.172			
			(0.179)			
lnH2*POL						0.155
						(0.130
_cons	2.092	3.598	0.346	5.452	6.338	2.167
	(15.51)	(14.050)	(18.405)	(14.703)	(12.977)	(16.018)
RMSE	0.035	0.032	0.029	0.035	0.032	0.029
Obs	750	715	715	750	715	715
Wald Test	14.75**	12.92**	20.88***	13.35**	12.60**	18.76***
CD Test	-0.621	-0.946	-1.749	-0.875	-1.161	-1.717

***, **,* denote significance at 1%, 5% and 10% respectively

force and polity variables exhibit insignificant association with economic growth. The results provide sufficient evidence that although capital investment is adequate, the labor force and political environment have not facilitated the health infrastructure in increasing the GDP per capita level in SSA.

The main implication of our results is that although investment in physical infrastructure is good, it is not sufficient for a transformation of health care system in SSA. Nonetheless, a complete health infrastructure must include infrastructure for sanitation, potable water, transportation, communication, education, and energy (i.e. all of which are important ingredients in providing and accessing quality health care). Consequently, a horizontal health transformation is now imperative for countries in SSA, as Bloom (2014) points out that the capacity and reach of health systems must also be expanded. In addition to the accessibility of health care delivery, new models for conducting epidemiological surveillance and for the efficient deployment of physicians, nurses, pharmacologists, community health workers, and counsellors must be developed.

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KEY TERMS AND DEFINITIONS

Cross-Sectional Dependence: Occurs when errors are of cross-sections are correlated in a panel data due to due to omitted common effects or spatial effects.

Economic Growth: It is an increase in a country's productive capacity or output.

Gross Fixed Capital Formation: according to the World Bank, gross fixed capital formation includes land improvements, plant, machinery, and equipment purchases; and the construction of roads, railways.

Health Infrastructure: The basic services or social capital or structures of a country concerned with areas such as communicable disease control (including the safety of food), the protection of the health of mothers and children and the control of environmental contamination.

Heterogeneity: It refers to differences across cross-sections (countries) being studied.

Infant Mortality Rate: Infant mortality rate is the number of infants dying before reaching one year of age, per 1,000 live births in a given year or the probability per 1,000 that a new-born baby will die before reaching age five, if subject to age-specific mortality rates of the specified year according to the World Bank.

Panel Data: It is a dataset with time and cross-sectional component.

ENDNOTES

1 Statistics are obtained from the World Bank (2016).
2 Available at: http://www.systemicpeace.org/inscrdata.html
3 https://www.cia.gov/library/publications/resources/the-world-factbook/fields/2225.html#103
4 https://www.cia.gov/library/publications/the-world-factbook/fields/2227.html
5 https://www.cia.gov/library/publications/the-world-factbook/fields/2226.html

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APPENDIX

Table 7.

Country	Health Expenditures (% of GDP)[3]	Hospital Bed Density (Beds/1,000 Population)[4]	Physicians Density (Physicians/1,000 Population)[5]
Benin	4.6% of GDP (2014)	0.5 beds/1,000 population (2010)	0.06 physicians/1,000 population (2008)
Botswana	5.4% of GDP (2014)	1.8 beds/1,000 population (2010)	0.4 physicians/1,000 population (2009)
Burkina Faso	5% of GDP (2014)	0.4 beds/1,000 population (2010)	0.05 physicians/1,000 population (2010)
Cameroon	4.1% of GDP (2014)	1.3 beds/1,000 population (2010)	0.08 physicians/1,000 population (2009)
Congo, DR	4.3% of GDP (2014)	0.8 beds/1,000 population (2006)	-
Congo, Rep	5.2% of GDP (2014)	-	0.1 physicians/1,000 population (2007)
Cote D'Ivoire	5.7% of GDP (2014)	0.4 beds/1,000 population (2006)	0.14 physicians/1,000 population (2008)
Equatorial Guinea	3.8% of GDP (2014)	2.1 beds/1,000 population (2010)	-
Eritrea	3.3% of GDP (2014)	0.7 beds/1,000 population (2011)	-
Gabon	3.4% of GDP (2014)	6.3 beds/1,000 population (2010)	-
Gambia	7.3% of GDP (2014)	1.1 beds/1,000 population (2011)	0.11 physicians/1,000 population (2008)
Ghana	3.6% of GDP (2014)	0.9 beds/1,000 population (2011)	0.1 physicians/1,000 population (2010)
Kenya	5.7% of GDP (2014)	1.4 beds/1,000 population (2010)	0.2 physicians/1,000 population (2013)
Lesotho	10.6% of GDP (2014)	1.3 beds/1,000 population (2006)	-
Liberia	10% of GDP (2014)	0.8 beds/1,000 population (2010)	0.01 physicians/1,000 population (2008)
Madagascar	3% of GDP (2014)	0.2 beds/1,000 population (2010)	0.16 physicians/1,000 population (2007)
Malawi	11.4% of GDP (2014)	1.3 beds/1,000 population (2011)	0.02 physicians/1,000 population (2009)
Mali	6.9% of GDP (2014)	0.1 beds/1,000 population (2010)	0.08 physicians/1,000 population (2010)
Mauritania	3.8% of GDP (2014)	0.4 beds/1,000 population (2006)	0.13 physicians/1,000 population (2009)
Mauritius	4.8% of GDP (2014)	3.4 beds/1,000 population (2011)	1.62 physicians/1,000 population (2013)
Mozambique	7% of GDP (2014)	0.7 beds/1,000 population (2011)	0.04 physicians/1,000 population (2012)
Namibia	8.9% of GDP (2014)	2.7 beds/1,000 population (2009)	0.37 physicians/1,000 population (2007)
Nigeria	3.7% of GDP (2014)	-	0.41 physicians/1,000 population (2009)
Rwanda	7.5% of GDP (2014)	1.6 beds/1,000 population (2007)	0.06 physicians/1,000 population (2010)

continued on following page

Table 7. Continued

Country	Health Expenditures (% of GDP)[3]	Hospital Bed Density (Beds/1,000 Population)[4]	Physicians Density (Physicians/1,000 Population)[5]
Senegal	4.7% of GDP (2014)	0.3 beds/1,000 population (2008)	0.06 physicians/1,000 population (2008)
Sierra Leone	11.1% of GDP (2014)	0.4 beds/1,000 population (2006)	0.02 physicians/1,000 population (2010)
South Africa	8.8% of GDP (2014)	-	0.78 physicians/1,000 population (2013)
Sudan	8.4% of GDP (2014)	0.8 beds/1,000 population (2012)	0.28 physicians/1,000 population (2008)
Swaziland	9.3% of GDP (2014)	2.1 beds/1,000 population (2011)	0.17 physicians/1,000 population (2009)
Tanzania	5.6% of GDP (2014)	0.7 beds/1,000 population (2010)	0.03 physicians/1,000 population (2012)
Togo	5.2% of GDP (2014)	0.7 beds/1,000 population (2011)	0.05 physicians/1,000 population (2008)
Uganda	7.2% of GDP (2014)	0.5 beds/1,000 population (2010)	0.12 physicians/1,000 population (2005)

Chapter 10
Evaluating Cost Sharing Measures in Public Primary Units in Greece:
Cost Sharing Measures in Primary Care

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ABSTRACT

The mission of this paper is to investigate the economic viability and the workload imposed on nurses of the introduction of a cost sharing mechanism (€5/visit) in public primary health care units. The Ministry of Health provided administrative data for 2011 and 2012. Results highlighted the economic viability of the introduction of a cost sharing mechanism in Outpatient Departments of NHS Hospitals, as an annual economic benefit of €11.5 mil was reported. On the other hand, an annual deficit of €1.4 mil was estimated for Health Centers. Moreover, in the majority of Health Centers, nurses were put under altering employment in order to collect the fees. In times of economic recession, such as currently the case in Greece, negative consequences of cost sharing mechanisms may outweigh the positive ones. The decision on whether or not to introduce cost sharing arrangements is largely a political one and many factors (e.g. accessibility, equity, clinical outcomes) have to be taken into account, apart from economic results.

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INTRODUCTION

Rationale of Cost Sharing Arrangements and Their Effects on Accessibility

A major problem hindering the development of Primary Health Care is its underfunding from public schemes, which inevitably leads to its deterioration. Cost sharing arrangements is a mechanism considered as likely solution to this problem, which aims to upgrade quality of services, reduce moral hazard and, in long term, to minimize the use of private health care providers.

Considering cost sharing arrangements, there are three issues that should be taken into account: efficiency, due to limited demand for health services with low diagnostic and therapeutic value, additional likely revenues for the National Health System (Mossialos et al., 2002) and impact on accessibility.

Medical fees can yield positive or negative results. To elaborate on this, a reduced level of cost sharing for health services may not lead to significant reduction of health services utilization, but it may cause disproportionately high administrative cost. On the other hand, high levels of cost sharing may reduce moral hazard, but could also result in unsatisfied health needs resulting to "explosion of morbidity" (European Commission, 2009).

Another important issue to consider is social groups exempted from cost sharing. Exemption criteria include wages (ability to pay) and health condition. Specifically, low-income patients (unemployed, elderly, retired) and chronically ill patients are not obliged to pay for health care services, because cost sharing has a negative impact on them. Moreover, the implementation of cost-sharing exemptions requires integrated information systems, which increase administrative cost and minimize expected revenues due to high levels of health care services utilization (Krutilova, 2013; Swartz, 2010).

A matter of concern regarding effectiveness is the specific implementation of cost sharing for each patient according to his/her status. Although, this is a measure nearly impossible to introduce, it points out the social, economic and health consequences of cost sharing for different groups of people. The goal is to reach the so-called balance point of adequate financing of the health care system and equal access to qualitative health care services, without adding excessive burden on the insured patients and without producing negative effects on health conditions (O'Brien et al., 2000, Mossialos et al., 2002). Concerning the impact of cost sharing on health services utilization, Swartz (2010) concluded that the demand for health care depends on the price of that service. For the average person, an increase of cost sharing levels is not likely to have a negative effect on his/her health, but for vulnerable groups it is probable that there will be deterioration in health status. Swartz found that people with low income were disproportionately affected by an increase in health care cost and patients with poor health status respond differently to such an increase compared to healthy people. Similar results were found in another study conducted in Switzerland by Huber et al. (2012). Specifically, people with poor health and low socioeconomic profile referred that cost sharing had a strong negative effect. This study concluded that cost sharing reduces the use of health care services.

Administrative Expenses of Cost Sharing

According to the World Bank (2008), successful cost-sharing policies are those that are administratively cost-effective, feasible and practical. Effective exemption systems must be simple, transparent and easy to apply in order to have a positive impact, reach their goals and be administratively and economically achievable. The more complicated the system of exemptions is (e.g. various forms of cost sharing,

numerous exemptions), the more administratively costly the system for collecting medical fees gets (Krutilova, 2013).

There are no adequate data to ascertain that the economic benefits of cost sharing outweigh its drawbacks. However, qualitative information indicates that cost sharing increases expenditure for the Health Care System in the way that is managed. Moreover, low levels of cost sharing fail to generate notable revenue (O'Brien et al., 2000).

Administrative expenditures of cost sharing are composed of personnel and operational expenses (computer programming and servicing). The start-up administrative costs are higher than the continuing administrative expenses, and the most expensive component is the cost associated with computer system changes. These computer system changes involve programming procedures to assure that appropriate exemptions and services are involved and that co-payment charges are properly implemented in the system (Beck et al., 1987).

According to Swartz (2010), the administrative cost associated with medical fees collection is significant, so it is not introduced under Medicaid. Moreover, according to studies concerning cost sharing, health revenues have not been increased due to medical fees, but in 16 Sub-Saharan African countries, fees generated an average of around 5% of health system expenditure, gross of administrative costs (James et al., 2006).

Description of Health System and Provision of PHC in Greece

The Greek health system is characterized as a dual system. The supply side is organized largely along Beveridge's lines, with state provided hospital care and a network of rural health centers covering almost one-third of the population.

On the demand side, the system functions mainly along Bismarck's lines, with health insurance provided traditionally by 39 social security funds (SSFs) (Siskou, 2008), up until 2012 when the various funds merged into one fund (Law 3918/2011), namely the National Organization for Health Care Services Provision (EOPYY), which covers almost the entire population (Souliotis et al., 2015). EOPYY formally started operating in June 2011 and is the country's new body for the management of primary health care (PHC). Its role is to coordinate primary health care, regulate contracting arrangements with all health care providers and set quality and efficiency standards, so as alleviate pressure on ambulatory and emergency care in public hospitals. EOPYY's primary role is to act as the sole purchaser (demand side) of medicines and all health care services for all those insured, thus acquiring higher bargaining power against suppliers (Economou, et al., 2013).

In terms of PHC supply side, both public and private sectors provide primary health services. Up to January 2014, about 200 Public Health Centers and 1,500 Regional Health Offices operating under the umbrella of the NHS were located in rural and semi-urban areas. Also, 250 Social Security Institution (SSI) Outpatient Clinics were serving urban population (Lionis, 2011). Moreover, 131 Public (NHS) and 162 Private Hospitals Outpatients Clinics operating all over the country were serving both urban and rural population. PHC was also delivered through private practicing physicians (plus other health professionals, such as physiotherapists) and private diagnostic centers (contracted or not with SSF) (Karakolias and Polyzos, 2014). In February 2014, according to Law 4238/2014 the National Primary Healthcare Network (PEDY) was set up, consisting of Health Centers, SSI Outpatient Clinics and contracted (with PEDY) Health Professionals. The establishment of PEDY was an important structural change that was supposed to upgrade the provision of publicly funded primary care through improved co-ordination of the fragmented primary providers.

Health Expenditures and Financing and Accessibility of PHC in Greece

Total Current Health Expenditure (TCHE) in Greece before 2005(8.5%-8.6% of GDP) was slightly higher than the Eurozone average (8.2%-8.4% of GDP). There was also significant reliance on out-of-pocket payments as public expenditure (PE), was more than one percentage point lower (5.0%-5.1% of GDP) than the Eurozone's average (6.2%-6.4% of GDP). Between 2005 and 2009, when GDP rose by 19.7% (from €193bn to €231.1bn), TCHE increased by 41.5% (from €16.4bn to €23.2bn) and public expenditure increased by 66% (from €9.7bn to €16.1bn), a performance unparalleled by any other sector of significant public activity. However, because of the economic crisis, Health Expenditure has ever since dramatically decreased.

During 2009 and 2013 TCHE and PE decreased by 31.9% (from €23.2bl to €15.8bl) and 37.9 (from €16.1bl to €10bl) %, respectively. Horizontal cuts imposed by the Memorandum of Understanding (MoU) affected most of all outpatient care. These cuts resulted in a decrease of total outpatient expenditure by 40.5%, pharmaceutical care by 32.9% and inpatient expenditure by 25.4%. In Greece, unlike most other Eurozone countries where the level of health expenditure was maintained, health care became part of fiscal adjustments and consolidation.

According to the Greek System of Health Accounts (SHA), an increase in health expenditure during 2003–2009 was also reflected in outpatient expenditure. However, this increase was problematic, as during this period households were contributing 65–75% of the total €5.3–€6.5bn spent on outpatient care. From 2009 onwards, the already negligible contribution of Social Insurance and Government to primary care expenditure was further affected by horizontal cuts imposed by the MoU, resulting in a 24.3% overall decline (from 2009 to 2013). However, to confirm any cause and effect, more careful interpretations of this trend would be needed. Between 2009 and 2013, outpatient expenditure decreased by €2.6bn, 76.9% of which was a decrease in out-of-pocket payments. This possibly implies that individuals delay or forgo the use of primary health care services because of its increasing cost and the impact of the economic crisis on household budgets (Goranitis et al., 2014). The NHS electronic information system (ESYnet) provides supporting evidence, as it reports a continuous decrease (from 2009 to 2012) in the number of visits to afternoon outpatient hospital departments. Visits to afternoon surgeries of public hospitals (afternoon shifts) decreased by 6% in 2010 compared to 2009, by 19% in 2011 compared to 2010 and by a further 7% in 2012 (from 559,358 in 2009 to 527,602 in 2010, 429,903 in 2011 and 398,731 in 2012). Patients are obliged to pay a predefined fee for afternoon surgeries in public hospitals (escalated from €45 to €90 until August 2013 and from €24 to €72 since September 2013) and this could explain the decline of visits during the crisis.

As a consequence of the above-mentioned issues, the proportion of Greek population who report unmet needs during the crisis for various reasons (e.g. due to high costs, low proximity or long waiting) increased from 7.4% in 2008 to 11.2% in 2013. The corresponding figures for EU were remarkably lower, estimated to 6.5% in 2008 and 6.9% in 2013 (ELSTAT, 2014).

Outpatient and preventive care could play an important role during the economic crisis protecting the population from the negative health effects of unemployment and economic distress and ensuring that immediate health needs are not forgone due to financial difficulties.

Due to the economic recession, policies that should have been in the center of the policy agenda since 2010 were not introduced until 2014. Free access to primary health care for the uninsured that meet certain income criteria was implemented in September 2013 and the reform of primary health care to standards resembling those of the British NHS passed Parliament in February 2014 (Goranitis et al., 2014).

Instead of ensuring and facilitating access to primary health care, the government used it (cost-sharing measures) to increase revenues. In September 2010, a cost-sharing fee of three euros was imposed on visits to Outpatient Clinics of Public Hospitals and Health Centers providing exemptions for patients in the Farmers Insurance Agency (OGA), indigents, refugees, uninsured under 18 years of age and those over 70 as well as chronically ill patients. In January 2011, the fee increased to five euros for all citizens (including OGA beneficiaries) except for certain vulnerable groups, such as indigents, refugees, and patients with chronic conditions, patients in need of emergency care and patients in need of medication prescription.

The rationale behind the introduction of these cost-sharing fees was to avoid moral hazard and to increase resources allocated to public primary health units, which could partly cover operational shortcomings. Consequently, policy makers were supposed to provide (via public primary units) upgraded and high quality health care as well as to reduce the demand for visits to privately offered medical care (Tsirona, 2013; Stokou 2013a; Stokou 2013b). Eventually, the measure was abolished in April 2015 according to Gazette 490/2015.

However, both policy makers and members of the academia have touched upon the results of this cost–sharing regulation rather tangentially. Apart from evidence referring to citizens' willingness to pay (or not) the corresponding fees (Siskou 2013; Anagnostopoulou 2011; Dolgeras 2001) there was lack of data on the administrative consequences, in terms of wage expenses and personnel workload.

This paper aims to investigate the economic viability and the associated workload imposed on nurses by the operation of cost-sharing mechanism (€5 fees collection process) in public primary health care units (outpatient departments of public-NHS hospitals and public healthcare centers). This paper is organized as follows: in Methodology section we present the data sources and the elaboration process. The Results section is consisted by two sub-sections: in one are presented the economic results concerning outpatient departments of NHS hospitals and in the other are presented the economic results for healthcare centers. Finally, in the Last section we propose the implementation of some actions to improve the function and the efficacy of the cost sharing mechanism.

METHODOLOGY

For the purposes of the study, the Ministry of Health via the official portal *"ESYnet"* and the Statistical Service were used to obtain administrative data for the years 2011 and 2012. Data referred to 166 Health Centers and 105 Outpatient Clinics of NHS Hospitals. More specifically, the authors' database includes the following variables:

- The *number of patients' visits* per unit (NHS Hospitals' Outpatient Clinics and Health Centers). Only conventional cases are included in the database because in exceptional cases revenues were not collected. For 2011, there were no separate data for conventional and exceptional cases for Health Centers. Therefore, the authors estimated the conventional cases of Health Centers for 2011 according to the proportion of conventional to exceptional cases for 2012;
- The *annual revenues* generated from cost-sharing fees per health entity;
- The *number and the specialty of personnel* working for fees' collection per unit.

Administrative expenses were estimated, taken into account the annual average gross wage cost (about €21,500 for 2012) and the number of personnel employed for fees recovery.

The ratios of salary expenses to collected fees and collected fees to potentially (optimal) gained fees, were calculated for each unit under examination. Moreover, we calculated the average revenue per visit. Outpatient Clinics and Health Centers were classified to major groups based on the ratio of wage expenses to collected fees.

For those Health Centers that the ratio of administrative expenses to recovered fees was greater than 50% (mainly due to users' limited compliance with the measure), we re-calculated the economic consequences based on a hypothetic scenario that at least 55% of patients paid the fee. This percentage (55%) was estimated taking into account the proportion of specific population groups who were exempted from paying the fee according to relevant Ministerial Decisions.

RESULTS AND DISCUSSION

Investigating Economic Viability of Cost Sharing Mechanism in Outpatient Clinics of NHS Hospitals

It was found that 305 staff members (mainly administrative personnel) were employed in outpatient clinics of NHS hospitals to collect the fees. Their wage expenses were estimated to almost €6.6 mil annually, while, for 2012, the recovered fees amounted to more than €18 mil (Table 1).

Moreover, it was estimated that the €5 fee was paid for 71% of visits conducted in 2012. This result coincides with patients' and administrative directors' answers, concerning users' compliance with the measure. In a survey carried out by Siskou et al (2013) to 634 patients and 112 administrative directors of NHS hospitals, it was found that 70.1%[1] of patients had paid the fee, and 88.4% of directors mentioned that users complied with the measure.

However, between 2011 and 2012 the average revenue per visit was reduced by 16.6% (from €4.2 to €3.5). This may be due to: a) the number of patients who met the exemption criteria from the obliga-

Table 1. Revenues and wage expenses from the operation of cost sharing mechanism in outpatient clinics of NHS hospitals (N=105)

	2011	2012
a) Nb of users' visits	5,395,606	5,126,121
b) Recovered Fees	€ 22,584,738	€ 18,174,683
c) Nb of personnel collecting fees	305	
d) Wage expenses of personnel (2012)	€ 6,597,256	
e) % of Wage expenses to Recovered Fees	29.2%	36.3%
f) % of Recovered Fees to potential (optimal received) = b / (a x €5)	84%[1]	71%[1]
g) Average fee revenue / user visit	€4.2	€3.5
h) User visits / personnel (2012)	16,807	

Sources: ESYnet, Statistical Office of the Hellenic Ministry of Health and estimations obtained from the Center for Health Services Management and Evaluation of University of Athens (UoA)

tion of paying the €5 fee increased, or b) the patients' compliance with the measure decreased, or c) the personnel's tolerance towards patients' in compliance with the measure was increased. All the above-mentioned reasons are related to the economic recession.

In about 1/3 of the under study outpatient clinics in which 40% of patient visits took place, the proportion of wage expenses to received fees was estimated only 17%. That means that the measure was remarkably profitable.

NHS hospitals' outpatient clinics are classified into three groups according to the ratio of wage expenses to recovered fees, as follows:

- Up to 34% (N=35 outpatient clinics);
- From 35% to 64% (N=40 outpatient clinics); and
- Above of 65% (N=30 outpatient clinics).

Investigating Economic Viability of Cost Sharing Mechanism in Health Centers

It was found that about 250 staff members were employed in Health Centers to collect the fees. Notably, fees were collected exclusively by administrative personnel, only in 35% of Health Centers. In the remaining cases, other staff members, mainly nurses, were involved in the fees receiving process. For Health Centers experiencing a lack of administrative personnel, there was a legislation provision so that nurses collect fees. This means that some of the few nurses working in Health Centers[2], were under alter employment for bureaucratic duties instead of conducting community nursing activities, e.g. patient education/self-management, tobacco cessation, pregnancy testing and counseling, vaccination, insulin titration, blood pressure monitoring (Anderson et al., 2012). Evidently, this is a major obstacle to the development of public primary healthcare.

Remarkably, the wage expenses exceeded the collected revenues, estimated to almost € 5.4 mil annually, while the recovered fees amounted to less than €4 mil in 2012. A plausible explanation for this finding is that the €5 fee was paid for only 31% of all visits conducted in 2012. Consequently, the average revenue per visit estimated to less than €2 (Table 2).

Even under the hypothetical scenario that 55%[3] of users paid the fee, the proportion of wage expenses to potentially collected fees estimates to 76% (Table 2). This is probably correlated with the relatively low ratio of visits to personnel employed for fees collection (10,250 compared to 16,807 in Outpatient Clinics of NHS Hospitals).

Health centers have been classified into six groups according to the proportion of collected fees to potentially recovered:

1. More than 100% (N=11);
2. From 100% to 51% (N=27);
3. From 50% to 30% (N=34);
4. From 29% to 20% (N=32);
5. From 19% to 11% (N=31);
6. Lower than 10% (N=31).

It is worth mentioning that in 128 out of 166 Health Centers the collected revenues were equal to less than 50% of the potentially recovered.

Table 2. Revenues and wage expenses from the operation of cost sharing mechanism in health centers (N=166)

	2011	2012
a) Nb of users' visits (not emergency, not prescription)	2,837,826	2,552,137
b) Recovered Fees	€ 5,301,825,84	€ 3,961,258
c) Nb of personnel collecting the fees	250	
d) Wage expenses of personnel (2012)	€ 5,368,355	
e) % of Wage expenses to Recovered Fees	136%	
f) % Wage expenses to Recovered Fees in case that 55% of users paid the fee (2012)	76%	
g) % of Recovered Fees to potential (optimal received) = b / (a x €5)	37%	31%
h) Average fee revenue / visit	€ 1.9	€ 1.6
i) Visits / personnel (2012)=a /c		10,250

Sources: ESYnet, Statistical Office of the Hellenic Ministry of Health and estimations from Center for Health Services Management and Evaluation of University of Athens

CONCLUSION AND PROPOSALS

The implementation of Cost-Sharing mechanism in Outpatient Departments of NHS Hospitals was found to be economically viable, resulting in an annual net economic benefit of about €11.5 mil.

On the other hand, due to the implementation of this mechanism Health Centers were found with an estimated annual deficit of €1.4 mil. It was due to the very low proportion of patients who paid the fee (only 31% in 2012). In spite of the uncertain number of the patients who were fallen under the exemptions of the regulation, one can assume that in many health centers, personnel were not strict in collecting the fees due to the economic recession.

Another major issue reported in Health Centers was the alter employment of personnel to collect the fees. Only 35.8% of collectors were administrative personnel, whereas in more than 50% of health centers nurses collected the fees. This practice of nurses' misuse is contrary to international trends where the role of primary health care nurses is supposed to be upgraded in order to improve both clinical outcomes and efficiency of the health system.

For instance, the Ontario Primary Care Nursing Task Force Report includes recommendations for maximizing and expanding the role of primary health care nurses that is likely to result in greater cost savings, improved system efficiency and better health outcomes. Moreover, there is evidence from the USA for enhanced nursing roles as nurses are treated as leaders of primary care units. The Patient Protection and Affordable Health Care Act (2010), recognizing the significant role that nurses play in providing primary care, authorized a $50-million grant program for the development and operation of nurse-managed health centers. These centers are community-based primary health care clinics in which nurses are the main service providers (Liu et al., 2014).

Bearing in mind the negative economic results of the implementation of cost-sharing mechanism in Health Centers, the users' expressed discomfort towards the measure (Siskou et al., 2013) and the inefficient allocation of the few primary nurses, structural changes are considered necessary in order to improve the efficiency of the measure.

What follows are two alternative proposals to solve the afore-mentioned issues. The second one strongly recommended as an innovative, efficient and integrated solution:

1. **Abolition of the cost-sharing fee in Health Centers:** Unlike the NHS Hospitals Outpatient Clinics where the fee should be set to €10. In case of patients with a Health Centre physician referral, the fee would be limited to €5. Vulnerable groups will be exempted from the obligation of paying the fee;
2. **The introduction of an electronic debit card[4]:** Both public and contracted with EOPYY private health care service providers will be obliged to charge the user for the supplied services/products via the debit card. Patients will have to pay fees to the N.H.S. once a year via their tax statement. Exemptions from cost sharing arrangements will be set based on family income and social criteria. The cost –sharing system will be progressive. In other words, low-income patients will not be charged for health care services, whereas high-income patients will be charged based on available income. Using an electronic debit card will create a paperless system, saving working hours and improving transparency. By the end of each fiscal year, patients will receive adequate information for the reported (on the card) health expenditure; so, no one will have any incentives to be charged for over-consumption of health services or products, which can result in moral hazard.

To conclude, cost sharing measures could be an effective tool to avoid overconsumption of health services under certain circumstances. However, it is worth considering that due to Greece is going through a major economic recession negative consequences may outweigh the positive ones. The introduction of a cost-sharing mechanism is a political decision that should take into consideration many factors (e.g. accessibility, equity, clinical outcomes) and not only likely economic results. Moreover, implementation of modern and innovative technologies for handling administrative issues of cost sharing arrangements is likely to improve both efficiency and transparency.

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ENDNOTES

1 We have to mention that some of the patients who didn't pay the fee were falling under the exceptions of the regulation.

2 In 2012, nurses who were working in Health Centers amounted to about 1,600 (Health Map, 2015) or 0.8 /1,000 rural areas inhabitants!

3 Estimates based on the proportion of specific population groups exempted from paying the fee according to relevant Ministerial Decisions.

4 In France such an electronic health debit card was firstly introduced in 1998 resulting of bureaucratic procedures simplification and cost savings.

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Chapter 11
Policies and Politics:
The Alternatives and Limitations of Health Finance Reform in Hong Kong

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ABSTRACT

Since the late 1950s, Hong Kong's public health services have increased. They are mainly funded by taxes, supplemented by minimal user fees. In the late 1980s, the government recognized the limitations of this financing model and has subsequently proposed alternative methods of funding. Their proposals have been rejected by various stakeholders, who represent different, and even conflicting, values and interests. This chapter describes the development of health services and the debates that have surrounded health financing since the late 1980s. It shows that the health finance debate in Hong Kong is not a simple issue that can be tackled by rational planning; instead, it is a complex consequence of welfare politics in an increasingly mobilized society.

INTRODUCTION

The earliest public health services in Hong Kong were mainly devoted to combating communicable diseases. As the government was largely unresponsive to demands for further services, the gap in provision was filled by traditional Chinese medical practitioners and hospitals operated by local philanthropic organizations. It was not until the late 1950s that the government expanded its role and investment in health care.

During the past five decades, a system of service provision has developed with a clear division of labour: the private sector oversees primary health care, and the public sector is responsible for the more expensive secondary and tertiary health care services. In terms of financing, the private sector is mainly funded by user fees, and the public sector by taxes.

From the 1990s onwards, there has been a heavier reliance on public health services in Hong Kong, due to improvements in these services and to the increasing number of people without the funds for private

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care. The burden of financing these services will soon become even heavier due to the aging population. Facing these challenges, the government has repeatedly called for health finance reforms. However, all its proposals, with the exception of a medical fee increase, have been met with strong resistance, and no decisions have been reached. In the process, conflicts have arisen among various stakeholders and social classes, though all agree that some type of reform is necessary.

This paper describes the development and characteristics of public health services in Hong Kong since the 1960s, various proposals for health care reform, and key conflicts among stakeholders. It will be shown that efforts for reform have been impeded by the welfare politics of this increasingly mobilized society.

THE DEVELOPMENT OF PUBLIC HEALTH SERVICES IN HONG KONG

The first long-term plan for the development of health services was initiated in 1957. Since that time, the government has played an increasing role in health services provision. In the 1960s, government financing was primarily devoted to the construction of clinics and hospitals. According to the White Paper "Development of Medical Services in Hong Kong",(1964) the government planned to construct a network of clinics, supplemented by specialists and hospital facilities, that would be operated by the government or by government-assisted voluntary organizations (Chan, 1996, p. 98). The document also laid down the principle that users were required to pay only a nominal fee for this universal public health service (Chau & Yu, 2003).

In 1974, the White Paper "Further Development of Medical and Health Services in Hong Kong" was endorsed. Its major objectives were to improve the hospital bed to population ratio and to establish a network in which regional hospitals and clinics combined forces with the private sector to provide primary health care. The fees charged for public health services were kept low. For example, in 1980, the charge for out-patient treatment was HK$ 3 and for in-patient treatment, HK$ 5 per day. In the 1980s, public health services continued to expand: there was a 17.5% increase in the number of government hospital beds during the decade. In the mid-1980s, however, cost efficiency became a priority. The government stated that,

The lesson of public health services all over the world is that increased expenditure does not necessarily translate into higher standards. What is really important is the way the money is used and how well the facilities are managed (Hong Kong Government, 1989, p. 14).

"The Delivery of Medical Services in Hospitals", also known as the Scott Report was published in 1985 (W.D. Scott Pty Company, 1985). It focused on health services administration, cost-recovery, and cost-containment. Improving the management of limited resources was a key issue in the 1990s. The Hospital Authority was formally established in December 1990, with the aim of maintaining the quality of services without increasing state investment.

While new forms of health financing were being explored, the easiest option—to increase user fees—was adopted. It was hoped that such policies could help to improve the Hospital Authority revenue and reduced demand on public health services (such as the accident and emergency services). In 1992, the out-patient fee was raised to HK$ 21 and the in-patient ward fee to HK$ 43. These rates are now HK$ 45 and $100, respectively. Though the increase seems dramatic, it is consistent with the growth in the

general income level (e.g., the median household income was HK$ 1,425 in 1976, and HK$ 18,100 in the third quarter of 2010).

While the government concentrated in hospitals and clinics construction plan, the private sector continued to concentrate on primary health-care provision offered in small, individually owned clinics (in the past decade, there has been an increase in health-management organizations and group-practice clinics). The fees charged by these clinics are determined by the market and are not subject to government regulation. Most users pay for their treatment, though some are covered by health insurance that is either independently purchased or provided as part of an employee benefit package.

The health system in Hong Kong is based on a "dual medical economy" in which "the government has been significantly involved in both the funding and provision of health services mainly through tax financing, whereas the private sector operates in a loosely organized manner as individual clinics that dominate the ambulatory care sector" (Yeung & Chan, 2006, p. 436). In 2005, private doctors provided 76% of the primary care services, and the Hospital Authority was responsible for 92.8% of secondary and tertiary care services. In 2009, the public share of secondary and tertiary health-care expenses was 82% and the ratio of private to public hospital beds was 1:7.1. There is clearly a distinct division of labour between the two sectors.

There was no significant progress in health finance reform in the 1990s, and in the last decade health care has become further complicated by three factors: a series of financial crises beginning in the late 1990s, higher costs prompted by a rapidly aging population and outbreaks of infectious diseases (e.g., Avian Flu, SARS), and public outrage on the part of low-income earners and the middle class, who complain of the compound burden of financing health care through user fees and extra taxes. There is widespread recognition of the need to reform the health finance system.

Public health expenditure has steadily increased in the past four decades. It soared from HK$ 252 million in 1970/71 to HK$ 9,290 million in 1990/91 when the Hospital Authority was established, and by 2008/09 had grown to HK$ 36,706 million. Although the Hospital Authority intended to ensure more efficient use of financial resources, government funding increased almost four-fold from 1991/92 to 2010 (from HK$ 8,562 million in 1991/92 to HK$ 33,098 million).

Approximately 90% of public health expenditure goes to the Hospital Authority, which has no other significant source of income. Government subsidies accounted for 92.8% of the Hospital Authority's budget in 2001 and 90.6% in 2010. The second-largest source of income for the Hospital Authority is user fees. Despite increases in these fees in the last decade, they still accounted for only 7.5% of the budget in 2010 (see Table 1).

Total health expenditure, including both public and private, increased 381.7% in the period between 1989 and 2007. Government expenditure rose 482.9%, and user fees increased by 287.4%. The contribution of private insurance agencies to health expenditure increased 16-fold during this period, reflecting the growing popularity of this means of managing health risks among those who can afford it (see Table 2).

The share of private insurance in total health expenditure has increased steadily, from 1.3% in 1989/90 to 5.6% in 2006/07. The government maintains the largest share (rising from 39.4% in 1989/90 to 57.6% in 2003/04, but dropping to 49.9% in 2006/07). The total share occupied by insurance (including employer provided and private) remained stable, with 11.9% in 1989/90 and 13.0% in 2006/07. Nevertheless, share of employer-provided insurance decreased whereas the share of private insurance increased significantly. User fees, which accounted for 46.8% of total health expenditure in 1989/90, decreased to 35.2% in 2006/07. Nevertheless, Wagstaff (2005) maintains that the share of user fees is catastrophically high in comparing to other East Asian countries. In 2006/07, the share between public and private sector was

roughly equal, though the public sector share was the single largest source, and took care the majority of the more expensive secondary and tertiary health services. (see Table 3).

As Leung et al. have noted, when public health services rely on tax revenue, the burden of financing is shouldered by the well-to-do and the poor benefit, thus creating a net redistribution of resources from rich to poor (2008, p. 3). O'Donnell et al. similarly observe that the Hong Kong has the most progressively financed and strongly pro-poor system of the Asian countries compared (2007; 2008).

The situation in Hong Kong is clear: total health expenditure is steadily increasing; an growing share of public expenditure is devoted to health services; relying solely on better resource management will not solve the problem; and, for taxpayers, the set-up is not equitable—contribution does not equal consumption. The increasingly heavy reliance on public expenditure, without alternative funding sources, has become unsustainable, especially since the current tax-funded system has become the target of criticism.

HEALTH FINANCE REFORM

Financing health services was a concern even in the 1980s. During a Legislative Council debate in March 1984, Dr. Henrietta Ip suggested a medical insurance scheme where "able-bodied" citizens would pay a minimum premium and a modification of the current subsidy policy to achieve better value for money (Chan, 1996, p. 234). That year the government announced a plan to review the hospital services and commissioned the W. D. Scott Pty Co. from Australia to conduct the review. The Scott Report (W.D. Pty. Company, 1995) proposed the establishment of an independent Hospital Authority and an increase in hospital charges to improve cost recovery. The Provisional Hospital Authority was established in 1988 and was formally recognized as the Hospital Authority in December 1990.

The Provisional Hospital Authority proposed to set the cost-recovery level at 15 to 20%. In 1990, faced with accusations of unfair treatment of low-income families, the Secretary of Health and Welfare repeatedly declared that "no one will be denied adequate medical services because they cannot afford it. This is a policy statement, and policy statements do not change" (Chan, 1996, p. 241). This assurance held true in the following two decades: the principles of universality and low user fees have been maintained.

In 1993, the government published *Towards Better Health*, (1993) a position paper that suggested fee increases, but the proposal was met with strong resistance and was not adopted. In 1997, the government commissioned a team of experts from Harvard University to conduct a vigorous review of the health-care and finance systems. The resultant report "Improving Hong Kong's Health Care System – Why and For Whom?" was submitted to the government in 1999. The team proposed two schemes to tackle rising health costs: the Health Security Plan (HSP) and the Savings Accounts for Long-Term Care (Medisage). The HSP was conceived as a contributory pay-as-you-go scheme funded by employers and employees, which contributes to in- and out-patient treatments in both public and private facilities. Employers and employees would also contribute to Medisage, a mandatory long-term care insurance policy. The government would provide support to the elderly, poor, and unemployed who could not afford to contribute.

The public, however, disliked the compulsory redistribution associated with medical insurance. The budget for such schemes was also questioned by many stakeholders (e.g., Lau & Yu, 1999). The government decided to conduct another round of consultations, which resulted in the publication of "Lifelong Investment in Health" in 2000. This document offered the public more options: the maintenance of the government-funded model, an increase of fees and charges, or the establishment of individual health protection accounts for acute care after the age of 65. Again, the plan did not receive general support:

the public remained hesitant to adopt a health insurance scheme. Critics of these plans have argued that changes are not necessary, and that similar results could be obtained by better rationalization of resources, more attention to health prevention, and a more progressive taxation system.

The Report, "Final Report: A Study of the Health Care Financing and Feasibility of a Medical Savings Scheme in Hong Kong" was published in 2004. The government concluded that the general public did not support compulsory contributory saving schemes, particularly younger adults. Even if such schemes were endorsed, the contributory level would have to be very low, given the consequences of the economic recession in 2003. The government chose not to pursue actions that would cause public discontent (Yu, 2006). Instead, further consultation and prolonged discussion were proposed in order to keep the agenda alive.

The document "Building a Healthy Tomorrow" was published in 2005, reviewed Hong Kong's health system, with special attention to health financing. It was followed in 2008 by another position paper, "Your Health, Your Life", which solicited the public's views on reforms to the health system and its response to five methods of health financing: mandatory social health insurance, user fees, medical savings accounts, voluntary private health insurance, and personal health care reserves (combining mandatory savings and insurance).

After long consultation and discussion, *My Health My Choice: Healthcare Reform Second Stage Public Consultation* was published in 2010. The government realized that the public, while recognizing the need for reform, had reservations about mandatory schemes and preferred voluntary, individual health insurance schemes. It has decided to pursue the Voluntary Health Protection Scheme (HPS) —a government-regulated but privately operated scheme. A sum of HK$ 50 billion will be allocated for subsidizing HPS subscribers. It is important to note that the government has made it clear that, given its voluntary nature, the HPS cannot tackle long-term health-care financing problems and can only offer supplementary funding for more effective use of private health services.

Twenty years of consultation and public discussion have resulted in the adoption, perhaps temporarily, of a limited voluntary private insurance scheme. The sustainability of Hong Kong's public health system remains in doubt.

HEALTH FINANCE AND WELFARE POLITICS

The current health-care system, as noted, is pro-poor, with a strong orientation towards equitable treatment. Leung et al. argue that it is even more marked in pro-poor in terms of redistribution than in the social insurance systems adopted, for example in South Korea and Taiwan (2008, p. 3). The document, "Your Health, Your Life", provides a good summary of the debates surrounding health-care reform. These debates have not been restricted to methods of calculating benefits or contributions; they have also focused on the values represented by various finance options as outlined below (Food & Welfare Bureau, 2008, p. 44):

1. **Individual vs. Communal:** As the current tax-funded health system has already addressed low-income needs, the public is reluctant to adopt an additional burden of social insurance by pooling resources and risks (which translates into additional taxes for those better off).
2. **Risk-Pooling vs. Saving:** Most people felt their savings might not be adequate to cope with their medical expenses, but those with high incomes expressed stronger support for voluntary or manda-

tory health insurance, whereas those with low incomes tended to support the current tax-funded system.

3. **Voluntary vs. Mandatory:** There is a general bias against any mandatory scheme; voluntary options, such as voluntary health insurance and, to a lesser extent, user fee increases are preferred.
4. **Equity vs. Two-Tier System:** While those who have taken up greater tax burden and can afford the payment are demanding better quality health services for them, low-income groups are concerned that they will not be granted equal access if there is any change to the current system.

Roberts (2006) rightly notes that societal values are the ultimate determinant of health systems, and in Hong Kong, concerns about equity—in terms of service consumption (i.e., equal access to all) and service financing—have played an important role in decisions about health care. Yeung and Chan (2006) have observed that the current system separates the users from the payers – with those who are paying (the tax) mainly consuming private sector services, which will easily engender a feeling of antagonism between the payer and the uses. The system is supported by taxes paid by those who belong to the narrow tax base in Hong Kong (high tax exemptions allow a large portion of the working population to avoid taxation).

The past decades of health financing in Hong Kong have created a strong vested interest in users who have been only required to pay low fees and have been exempt from taxation. It is not surprising that the strongest resistance to change originated in low-income groups. Beginning in the early 2000s, however, the middle class, debilitated by the financial crisis, resented the obligation to pay more tax or compelled to contribute to social health insurance scheme to finance the health care system (Chan, 2009).

The government too is always keen to enact reforms that will reduce the financial burden of health care and deter the growth of a dependency culture. Still, it is unlikely that it will risk the political gamble of introducing social insurance schemes that, despite their reasonableness, will certainly be unpopular among all social classes (Yu, 2006). Both the government and the public are trapped in a dilemma: they recognize the need to change but are resistant to take up the burden of change. The current end result—the voluntary private insurance scheme—represents the lowest common denominator. Critics is already there arguing that this scheme will prove ineffective and have urged the government to do something different.

As Cheung notes, the government's failure to provide solutions is not only due to its lack of clear policy but also to the decline of its power and the lack of social cohesion in an increasingly differentiated and politicized environment. Political consultations and negotiations have been undertaken in the uncertain arena of partisan politics and political mobilization (2009, pp.10–11).

CONCLUSION

The issue of health financing cannot be solved simply by performing financial calculations and assuming that stakeholders will take up assigned positions and responsibilities. The citizens of Hong Kong have become increasingly skeptical about their government and are motivated to challenge its policies. The debates of the last twenty years clearly illustrate that the conflicts are based on opposing values. A change of the system will reflect a change of values, and a corresponding reassignment of risk responsibility among different social classes.

Table 1. Hospital authority account, 2000–2010 (HK$ m)

Year	Total Income	Government Subsidy	User Fees Collected
2001	30,336	28,159	754
2002	31,474	30,138	782
2003	31,325	29,977	849
2004	31,858	30,039	1,243
2005	30,267	28,417	1,386
2006	30,130	28,019	1,628
2007	30,680	28,041	1,987
2008	32,976	29,915	2,296
2009	35,106	31,915	2,527
2010	36,544	33,098	2,726

Source: Hospital Authority Annual Report, *various years*

Table 2. Total health expenditure at current market price, 1989/90–2006/07 (HK$ m)

Fiscal Year	Total Health Expenditure	Government	Employer-Provided Group Medical Benefits	Private Insurance	Private Household Out-of-Pocket Expenditure
1989/90	19,659	7,749	2,075	263	9,202
1990/91	23,788	10,016	2,375	306	10,716
1991/92	29,382	13,394	2,755	361	12,537
1992/93	34,173	15,844	3,204	419	14,332
1993/94	39,486	18,658	3,695	480	15,910
1994/95	44,823	21,582	4,177	716	17,618
1995/96	51,288	25,316	4,680	1,336	18,963
1996/97	56,854	28,653	5,338	1,641	20,557
1997/98	62,231	31,671	5,841	1,941	21,888
1998/99	66,273	35,800	6,010	2,188	21,347
1999/00	65,929	35,997	5,745	2,374	21,214
2000/01	67,290	37,028	5,546	2,541	21,619
2001/02	68,687	39,152	5,396	2,721	20,847
2002/03	67,105	38,526	5,203	2,935	19,839
2003/04	69,214	39,889	5,115	3,079	20,443
2004/05	68,263	37,094	5,150	3,284	22,114
2005/06	70,643	36,930	5,395	3,663	23,753
2006/07	75,048	37,417	5,573	4,213	26,451
Increase (%)	381.7	482.9	268.6	1601.9	287.4

Source: Food & Health Bureau, *date unknown*

Table 3. Distribution of health expenditure by sectors, 1989/90–2006/07 (%)

Fiscal Year	Government	Employer-Provided Group Medical Benefits	Private Insurance	Private Household Out-of-Pocket Expenditure
1989/90	39.4	10.6	1.3	46.8
1990/91	42.1	10.0	1.3	45.1
1991/92	45.6	9.4	1.2	42.7
1992/93	46.4	9.4	1.3	41.9
1993/94	47.3	9.4	1.2	40.3
1994/95	48.1	9.3	1.6	39.3
1995/96	49.4	9.1	2.6	37.0
1996/97	50.4	9.4	2.9	36.2
1997/98	50.9	9.4	3.1	35.2
1998/99	54.0	9.1	3.3	32.2
1999/00	54.6	8.7	3.6	32.2
2000/01	55.0	8.2	3.8	32.1
2001/02	57.0	7.9	4.0	30.4
2002/03	57.4	7.8	4.4	29.6
2003/04	57.6	7.4	4.4	29.5
2004/05	54.3	7.5	4.8	32.4
2005/06	52.3	7.6	5.2	33.6
2006/07	49.9	7.4	5.6	35.2

Note: There are other sources of revenue, such as service providers' funds, corporation contributions, non-profit institution contributions, and non-patient-care-related revenue. Nevertheless, the total share of these items small (2.8% of the total in 2006/07).

Source: Adapted from Food & Health Bureau, *date unknown*

The technical plans of bureaucrats can no longer adequately address the welfare politics and value conflicts that have plagued health-care finance. The current situation is the lowest common denominator and does not represent a long-term or adequate solution. The government has clearly stated that it can only provide supplementary funding. As Sidorenko and Butler note, voluntary private health insurance might fail to protect the most disadvantaged (2007, p. 48).

Voluntary private health insurance might be able to reduce the public finance burden slightly, by enabling the insured to meet their needs with private health services. Nevertheless, given the aging population of Hong Kong, the increases in life expectancy, and the high costs of secondary and tertiary health care, the history of procrastination must come to an end. During the wait for the government to assume a leading role in determining health, consultations have created a platform for various stakeholders. The next move belongs to these stakeholders: to make realistic compromises to achieve a better solution.

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KEY TERMS AND DEFINITIONS

Debate: A method of interactive and representational argument.

Financing Model: An abstract representation that is meant to correspond to a real world financial situation.

Rational Planning: The process of realizing a problem, establishing and evaluating planning criteria, creating alternatives, implementing alternatives, and monitoring progress of the alternatives.

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Chapter 12
Linking Cost Control to Cost Management in Healthcare Services:
An Analysis of Three Case Studies

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ABSTRACT

The issue of healthcare costs has become increasingly problematic over the years. This chapter summarizes the problems faced by hospitals when measuring the costs of healthcare treatments, explaining how an Activity-Based Costing (ABC) framework can be successfully adopted in healthcare settings. After describing the theoretical foundations of cost control and cost management, the chapter continues with the analysis of three real-life applications of ABC in a hospital, drawn from the process analysis and activity-based costing experience developed at the Azienda Ospedaliero-Universitaria "Ospedali Riuniti" (Joint Hospitals) of Trieste, Italy. In particular, the cases are about cost measurement in cardiology, odontostomatology, and radiology, and describe the technical solutions applied for computing the costs of selected therapeutic and diagnostic treatments. A particular emphasis is placed on how these measures have been subsequently used by hospital managers and medical personnel in order to gain insights and to improve the efficiency of the processes developed within the organization.

INTRODUCTION

Healthcare has experienced significant changes in competition and regulation over the last decades, with an ever prominent role played by market forces in shaping national policy debates regarding funding and cost containment (Cardinaels & Soderstrom, 2013). Considering that in many countries healthcare

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ranks among the largest economic sectors (Ditzel et al., 2006), it is not surprising that healthcare represents a significant portion of public spending. Moreover, most countries have experienced a rise in the percentage of Gross Domestic Product (GDP) devoted to national health systems over the past few decades (Reinhardt et al., 2004; Perotti, 2006; Pammolli & Salerno, 2006; WHO, 2000, 2010; McKinsey Global Institute, 2008; Armeni & Ferrè, 2013; Scheggi, 2012). In 2011, countries in the Organization of Economic Cooperation and Development (OECD) spent an average of 9.5% of their GDP in healthcare, up from an average total spending of 7.8% in 2000 (OECD Health Statistics, 2013). The reduced growth rates (or, in some cases, even recessions) that several European countries experienced between 2008 and 2013 put a strain on public spending, and forced some governments, where national health services are established, to introduce drastic measures for ensuring financial stability.

The compounded effect of aging populations and increases in health care costs prompted many governments to strive for betterments in the efficiency of the management of their national health services, often by means of tightened budget constraints and widespread cost cutting efforts. The gradual introduction, started in the 1980s, of Diagnosis-Related Groups (DRG) for funding healthcare providers is an example of such efforts. Under this mechanism, the payment to the providers (hospitals and physicians) depends on the nature of the patient's illness, not on the amount of resources used to treat the payment. An increase of resources used to treat the illness, therefore, does not translate in an increase in hospital reimbursement, thus shifting the cost risk from the insurers (private or governmental) to the providers of healthcare (Cardinaels & Soderstrom, 2013). Hospitals have reacted by introducing cost containment measures, including governance models and cost accounting systems designed around corporate examples. However, simply transferring systems and methods from for-profit corporations to providers of healthcare services could lead to erroneous results (Alexander & Weiner, 1998), especially when decisions concerning the appropriateness of different medical treatments are based exclusively on cost information.

In order to understand the root causes of the surge in healthcare expenditures, it is useful to consider that, even if in most countries healthcare is not provided a in competitive market context, there is nonetheless a demand for and supply of healthcare services. Healthcare demand, although peculiarly subjective, is mainly driven by supply. In fact, the availability of specific medical treatments often generates its own demand. In turn, supply is influenced mainly by technology (i.e., the ability to treat). Historically, technology has transformed medicine into a discipline in which professionals deal not only with the symptoms, but also with the causes of the disease (Drouin et al., 2008). New therapies, products, and medical services set expectations to a new level, pulling up demand. Supply is influenced by capacity: since health care is free or heavily subsidized for many patients, the mere presence of healthcare facilities affects the rate of their consumption (Drouin et al., 2008; Ehrbeck et al., 2010). Finally, supply is also affected by incentives offered by providers: funding policies set by healthcare regulators and governments can determine under- or overproduction of specific treatments or services.

Demand, on the other hand, is relatively insensitive to price (being most users fully or partly subsidized), and it is mainly driven by social norms, wealth (the higher a country's GDP, the higher the demand for healthcare services), current and expected health. The influence of said variables on the demand and supply of healthcare tends almost invariably to generate an increase in the availability of healthcare products and services, since the system is apparently unbounded, given the probable evolution of medical technology and healthcare expectations. Although the above factors are indubitably relevant, it is our opinion that one of the drivers which can explain a significant part of the healthcare costs is complexity, and how it is managed. In the last century, the role of medicine and physicians has changed

dramatically. Approximately a century ago, before the discovery of penicillin, medics acted like craftsmen in that they could have all the necessary knowledge in their field, and they had the ability to apply it. As a result, autonomy, in sense of independence and self-sufficiency, emerged as one of the principal values of the medical profession. The current situation is completely different: the number of medical treatments and surgical procedures has increased, and so has the number of drugs available.

Quoting a TED talk on the subject (Gawande, 2012):

There was a study where they looked at how many clinicians it took to take care of you if you came into a hospital, as it changed over time. And in the year 1970, it took just over two full-time equivalents of clinicians. That is to say, it took basically the nursing time and then just a little bit of time for a doctor who more or less checked in on you once a day. By the end of the 20th century, it had become more than 15 clinicians for the same typical hospital patient -- specialists, physical therapists, the nurses.

The increased complexity in the medical treatments had as a side-effect the emergence of coordination issues among different specialists, because the processes have become more fragmented, involving a larger number of professionals. Therefore, organizational problems have become increasingly important for healthcare providers, and so have the costs associated with them. However, there is mounting evidence that the most expensive care is not necessarily the best care: the most effective and often the most efficient healthcare treatments are those developed with a systematic approach. Having components of the highest quality does not assure the best results, and yet in today's medicine there is a great emphasis on components (the best drugs, the best technologies, the best specialists, etc.). *What it lacks is a holistic approach to processes*.

Therefore, it is not surprising that, given the recent surge in healthcare costs, cost analysis and control in the production of healthcare services has become increasingly important. In our view, one of the most important supports for providers to better organize their activities is the availability of relevant information. Therefore, the data analyzed should be elaborated within a framework that takes into consideration the systemic reality (i.e., the information should be able to reflect the level of complexity, the interconnections, and the constraints of the system). Translating this concept into the measurement and reporting of costs means the cost accounting system should provide information with a level of detail and a depth of analysis consistent with the complexity of the processes being measured. In this sense, Activity Based Techniques (ABT) represents an indubitable improvement over traditional measurement systems in providing valuable information for process management interventions such as Activity Based Management (ABM) and Business Process Reengineering (BPR).

BACKGROUND

The traditional view of cost accounting is that services or products consume resources (Baker, 1998, p. 3). Conventional cost systems therefore, assume a direct relationship exists between the level of product or services provided and the amounts of the resources utilized. Traditional performance measures of productivity, such as "labor productivity", defined according to this view, are therefore flawed. Traditional cost systems led to over-emphasize the distinction between "variable costs" (i.e., costs that are correlated to variation in the output performed) and "fixed costs" (i.e., costs that are not dependent on the level of goods or services produced) (Cooper & Kaplan, 1998, p. 111).

In contrast, Activity Based Costing (ABC) theory recognizes that resource usage is intimately linked with the implementation of activities. The causal relation among these "entities" is expressed by a parameter called a "resource driver" which explains the measure of the resource consumption triggered by a definite activity (Cooper & Kaplan, 1988; Bubbio, 1993; Kaplan & Cooper, 1998; Sandison et al., 2003). Products and services, instead, consume activities. An "activity driver" thus defines the consumption of activities caused inside the organization by the delivery of products or services. As we will specify better later, activity drivers may synthetize either volume-related or non-volume-related connections between activities and products.

The ABC framework reveals a "double productivity circuit" that must be properly managed to achieve a superior level of efficiency (De Rosa, 2000, p. 17). At one side of the circuit there is what we may call a "resources productivity" which compares outputs in term of activities performed to inputs expressed by the amount of resources consumed. At the other side of the circuit stands the "activities productivity" which matches outputs obtained, articulated in term of products or services delivered, to inputs consumed, measured by the quantity of activity required to produce the outputs (Grisi, 1997, p. 101).

Cokins (2001) uses the analogy of an optical lens to show how ABC "serves as a translator of general ledger data to provide more focused information for improved decision support. The lens not only translates the ledger costs into a more useful and flexible format, it also provides more sensory information". ABC, therefore, is neither a replacement for the general ledger accounting nor for responsibility accounting. Rather, it is a decoder of information provided by these systems in favor of its end users, such as managers and analysts, who apply cost data in decision making. "It translates expenses into a language that people can understand. It translates expense into elements of costs, namely the work activities, which can be more flexibly linked or assigned to business processes or cost objects based on demand-driven consumption patterns, not simplistic cost allocations" (Cokins, 2001, p. 11-12). Figure 1 summarizes the present stage of the cost assignment process at the hospital analyzed by this study, where the ABC still operates within a specific responsibility center (Hospital Departments), providing information to final users expressed in terms of cost of activities performed in that Department.

The accuracy of information provided certainly increases when compared to a traditional cost accounting system, but it still lacks the completeness of information encompassing all responsibility centers. The aim of the project launched by the hospital, based on the case studies conducted to date, is to expand the model to its full potential, providing information common to all responsibility centers of the organization, as shown in Figure 2.

A major improvement in cost assessment provided by the ABC methodology consists of the proliferation of cost objects. While the organizational departments are necessarily linked to the product or the service they contributed to deliver, activities may be perceived as performed in order to serve numerous "entities", such as different "customers", "suppliers", "channels" or, even, "type of customer order", "type of freight-haul trip", etc. Each of these entities may "serve as an intermediate repository to capture the diversity of the type of work output". By means of this attribution of costs to intermediate cost objects, ABC is able to recognize the role of complexity in determining the level of resource usage. Once activity costs have been preliminary traced to intermediate cost-objects, these costs are further retraced to subsequent stages based on appropriate activity drivers. Not recognizing this pattern of input-output relationship among activities would normally produce a significant distortion on the final cost figure computed. In Health Care Organizations, "cost-objects are any patient, product, service, contract, project, or other work unit for which a separate cost measurement is desired" (Baker 1998, p. 5).

Figure 1. Current stage of the cost assignment process

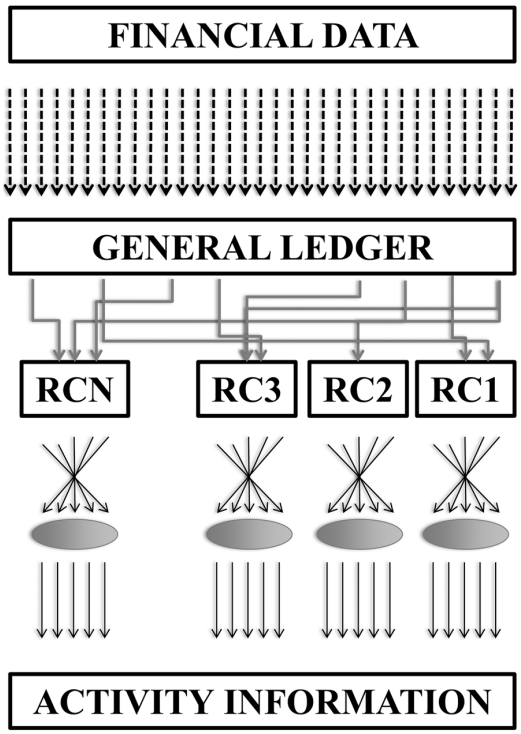
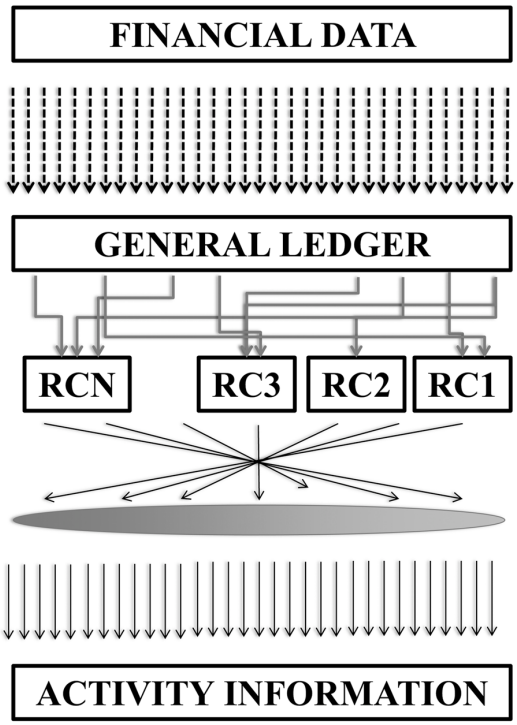


Figure 2. Desired stage of the cost assignment process



Another fundamental difference between "activity-based" and "conventional" cost systems is the use of *non-unit cost drivers* for assigning resource usage to cost object. ABC system assign costs using drivers based on the "quantity" of each activity used. Since the drivers are expected to appropriately synthetize the "root causes" that induced the activity to be performed, they may occur on several levels:

1. *Unit level drivers* correlate the increase of the resource consumption with every "unit" of a "cost-object" served. The "cost-object" may be a product or service delivered (e.g., a "specific treatment") or a customer served (e.g., "a single patient"); nevertheless, it can also be a supplier.
2. *Batch level drivers* link, instead, the variation of the inputs to activities carried out for every "batch" of "cost-objects". The costs incurred in performing these activities must, therefore, be assigned to individual batches, provided that they are completely "fixed", regardless of the number of units in the batch.
3. In addition to activities and costs that are outlined by "unit" and "batch" drivers, there is a third, higher-level of activities, usually labeled "sustaining activities". Their occurrence does not vary in accordance with the amount of "batches" or "unit" of the selected cost-object served in a specific period of time. Indeed, the amount of sustaining activities performed "reflect policy or strategy or response to the importance" of the cost-object. In short, they are "overhead work activities whose existence can be attributed to suppliers, products, service lines, channels, or customers" (Cokins, 2001). Each of those entities will have its "sustaining" cost object. This led to existence of specific

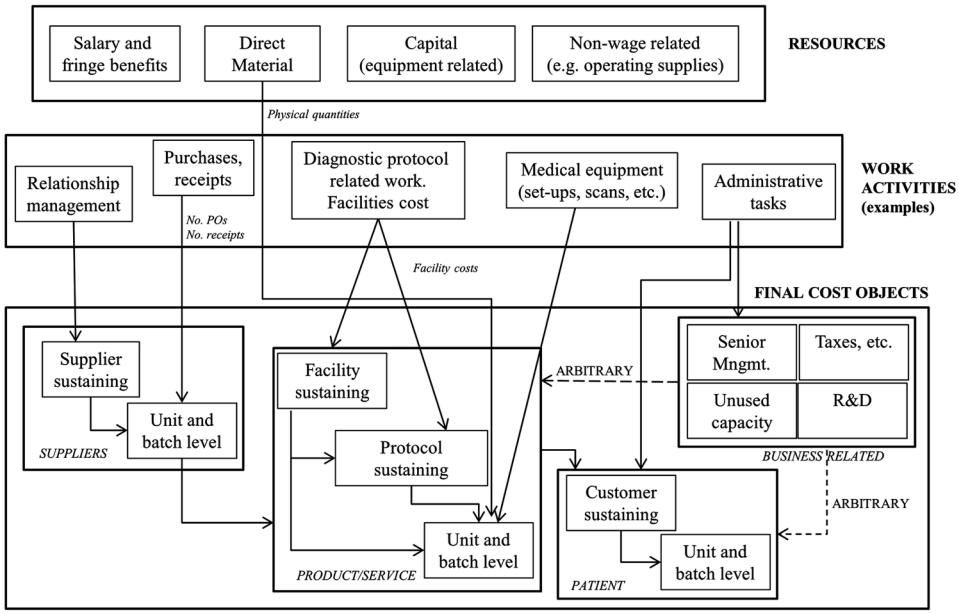
sustaining activity drivers that must be used in order to correctly trace costs incurred in performing these activities to the pertaining "sustaining" cost object. Among these drivers, the following two should be certainly mentioned:

a. **Product Level Drivers:** Which assume the necessity of the inputs to support the production of each different type of product.
b. **Facility Level Drivers:** Which are related to the facility's manufacturing process. Users of the ABC system will need to identify the activities which generate costs and then match the activities to the level bases used to assign costs to the products.

Moreover, among the sustaining activities, we should mention the so-called "business sustaining activities" which "do not directly contribute to customer value, responsiveness, and quality. That does not mean those activities can be eliminated or even reduced without doing harm to the business entity. For example, preparing required regulatory reports certainly do not add to the value of any cost object or to the satisfaction of the customer. However, that activity does have value to the organization because it enables it to function in a legal manner" (Cokins, 2001, p. 71) Costs incurred in performing these activities are usually traced to a "sustaining cost object group**"**. Although these costs may be attributed to the main cost objects in order to determine their full cost, their allocation is always arbitrary.

The existence of numerous cost objects and the presence of multiple levels of variability conduce to the identification of intermediate stages of activities; that is, activity outputs that are inputs to successive work activities. The cost of the resource used at the intermediate level cannot easily be traced directly to final cost objects because it is extremely difficult to perceive the causal relationship linking them. As a result, a multistage cost assignment process emerges in which a significant amount of what may be labeled as "organizational work activity" supports the activities that are in closer proximity to products and customer services. It is, therefore, possible to explicitly detect and measure the variation and diver-

Figure 3. Framework for cost assignment in healthcare using ABC



sity of resource consumption due to different products or service lines. By means of the multistage cost assignment process, the cost of these support activities is traced in proper proportions to other activities that require their work. These costs are eventually burdened into the primary activity costs. The ABC approach requires mapping every administrative and clinical activity involved in the treatment of specific medical condition (Ostinelli, 1995).

The activities identified are the analytical components of a process (i.e., a "net" of activities performed in the accomplishment of a specific aim) that "starts when the patient first presented for treatment and extended through surgery, recovery and discharge" (Baker, 1998). In order to adequately perceive the major interrelations existing among different activities, a process map should consequently be drawn. In hospitals, as in businesses, this requires the involvement in the project of "groups of experts" (i.e., multidisciplinary teams composed of personnel that possess "expertise" in performing each and every step of the process). Significant improvements in the level of efficiency may arise in this step of the work through the removal or the amendment of activities that prove to be redundant, erroneous, or useless and therefore are labeled as "non-value-added".

In fact, ABC is not only a method of costing, it also represents the first step toward Activity Based Management (ABM), a group of techniques for better managing the organization. ABC measures the cost and performance of activities, resources and cost-objects in order to generate more accurate and meaningful information for decision-making. By means of the data and information provided by ABC systems, managers gain a thorough understanding of their processes and cost behavior. This knowledge is easily diffusible within the organization: ABC and ABM describe activities using an "action-verb-adjective-noun" grammar convention that is highly understandable. "Such wording is powerful because managers and employee teams can better relate to these phrases, and the wording implies that the work activities can be favorably affected, changed, improved, or eliminated" (Cokins, 2001). In conclusion, the knowledge provided by the ABC system acts as a strong incentive for reengineering initiatives such as non-continuous improvement projects. It also supports ABM and its quest for continuous improvement by allowing management to gain new insights into activity performance by focusing their attention on the sources of demand for activities.

One major enhancement introduced by ABC is the focus placed on capacity costs. Prior to its introduction, in fact, "many organizations had very little insight and understanding about the location and cost of unused and non-productive capacity" (Gupta & Galloway, 2003, p.136). By means of measuring unused capacity, the ABC framework provides the critical link between the cost of resources used and the cost of resources available, as reported in the conventional financial statements. Advocates of ABC therefore developed the following fundamental equation (Kaplan & Cooper, 1998, p.118):

Cost of resources supplied = cost of resources used + cost of unused capacity

In the three case studies presented in this chapter, this relationship will be employed in order to explain the different components of the cost of treatments. Additionally, we should mention Time-Driven Activity Based Costing (TDABC) as an enhancement of traditional ABC systems. Its proponents advocate that it improves the original methodology by: eliminating the need for time consuming, subjective, interviews and survey process to define resource pools; that it reduces the processing time required to elaborate the data (thus allowing a more detailed mapping of the resource consumption patterns); that it is easier to maintain and update; and that it enables more accurate representations of over/under capacity

by expressing it in units of time (Kaplan & Anderson, 2003; Cleland, 2004; Kaplan, 2005; Demeere et al., 2009; Dewi et al., 2009; Dejnega, 2011; Öker et al., 2013).

Accurate cost measurement in health care is a difficult task, mainly because of the inherent complexity of healthcare itself (Kaplan & Porter, 2011). In fact, every treatment involves the consumption of many different types of resources – personnel, equipment, space, and supplies – each with different capabilities and costs. If one follows the care cycle, it appears clear how different resources, pertaining to different responsibility centers, are being activated every time a patient requires a treatment. This mix of clinical and administrative activities, and the variety of medical conditions presented by patients, adds complexity to the process, rendering the calculation of costs particularly difficult (Francesconi, 1993; Waters et al., 2001; Doyle et al., 2002, 2008; Geri & Ronen, 2005; Järvinen 2005; Cinquini et al., 2009; Chea, 2011; Bahadori et al., 2012; Eriksen et al., 2011; Groves et al., 2013; Kaplan et al., 2013; Kuchta & Zabek, 2011; Popesko, 2013).

The already complex path of care is further complicated by the highly fragmented way in which health care is delivered today (Kaplan & Porter, 2011). Care is also idiosyncratic; patients with the same condition often take different paths through the system. There is also a lack of standardization due to the fact that medical practices allow for considerable discretion – physicians in the same organizational unit performing the same medical process often use different procedures, drugs, devices, tests, and equipment. In operational terms, healthcare could be described as a highly customized job shop (Kaplan & Porter, 2011).

AN ANALYSIS OF THREE CASE STUDIES IN HEALTHCARE COST ACCOUNTING

The three case studies that follow summarize the results of a research effort aimed to improve the theoretical and operational framework of the process analysis and activity-based costing (ABC) at the *Azienda Ospedaliero-Universitaria* (AOU – Teaching Hospital) *"Ospedali Riuniti"* (Joint Hospitals) of Trieste, Italy. The AOU arises from the integration between the pre-existent hospitals of Trieste and the Faculty of Medicine and Surgery of the University of Trieste.

The aim of the project undertaken was to gradually enhance the AOU cost system, providing it with some ABC features that are currently still lacking. As a matter of fact, the hospital's cost system is still based on the traditional paradigm of organizational structure and control which is based upon responsibility centers. While this logic might still be considered useful for budgetary control reasons, it is not certainly helpful in determining the accurate costs of specific healing treatments provided by the hospital, especially when these treatments differ in complexity and intensity of resource usage. Indeed, the cost data gathered within the current AOU cost system lack the granularity required in order to correctly "trace" the resource consumption to definite activities or processes performed. It is, consequently, very challenging to compute the realistic cost of a detailed cost object. All the case studies where developed by multidisciplinary teams in which there was a jointly contribution of competences pertaining to different scientific areas (medicine and accounting).

Case Study 1: Cost Measurement in Hemodynamics

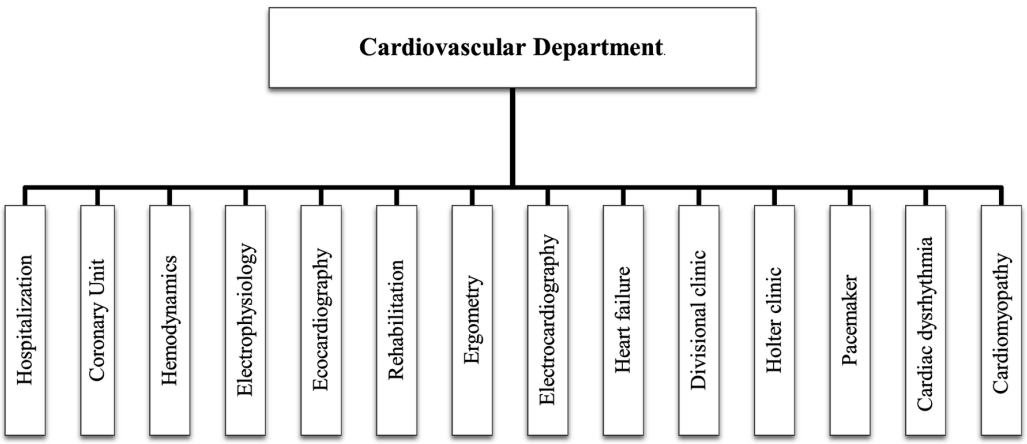
This case study describes the project undertaken in 2012 at the Cardiovascular Department of the AOU (Azienda Ospedaliera Universitaria – Teaching Hospital) of Trieste, Italy, and more exactly in the Cardiology Unit, in order to measure the costs of two specific procedures. G. Sinagra, Head of the Cardiovascular Department at the Teaching Hospital of Trieste, significantly contributed to the development of this case study, along with A. Salvi, A. Perkan, and L. Massa. The authors are also thankful to C. Ciccarelli, who developed a thesis on this topic under the supervision of G. Sinagra, A. Rebelli, and G. Grisi, and to the entire staff of the Cardiology Unit.

The organizational structure of the unit presented a high level of complexity, and the relevant data were stored in a multitude of databases. For these reasons, the analysis focused preliminarily on the macroscopic aspects of the organization, limiting the microanalysis to just two specific diagnostic and therapeutic processes. The two investigated processes, however, played a relevant role in the activities performed within the organizational unit. As a preliminary result, the following organizational chart was developed to illustrate the structure of the Cardiovascular Department:

The conventional cost system, already adopted by the hospital and although structured by responsibility centers, does not possess the required level of analysis necessary to reflect the organizational complexity shown in the above chart. For example, the Cardiovascular Department has nine different clinics (each requiring a specific cost pool), while the hospital cost system has only one cost center for all the clinics included in the Department. Therefore, it was necessary to implement a specific phase for the definition of the analytical cost pools and the measurement of the resources they used. The assigned resources were grouped by their nature as follows:

1. **Labor Costs:** Fixed costs traced to the specific cost pools using a driver based on personnel shifts.
2. **Cost of Equipment Utilization:** Fixed costs that correspond to yearly depreciation charges.
3. **Consumables:** Variable costs that, at least for medical supplies (the most relevant items in terms of value) are specific to the single treatments performed. The term "specific" in this context is used to identify the cost of a resource that is used *exclusively* for a specific treatment, or within a specific center, etc.

Figure 4. Organizational chart of the cardiovascular department



4. **Intermediate Care and Medical Services:** Variable costs linked to the specific treatments that require them.
5. **Administrative and General Overhead:** Indirect fixed costs that, not being accurately traceable, have been attributed to the cost pools using a traditional allocation basis.

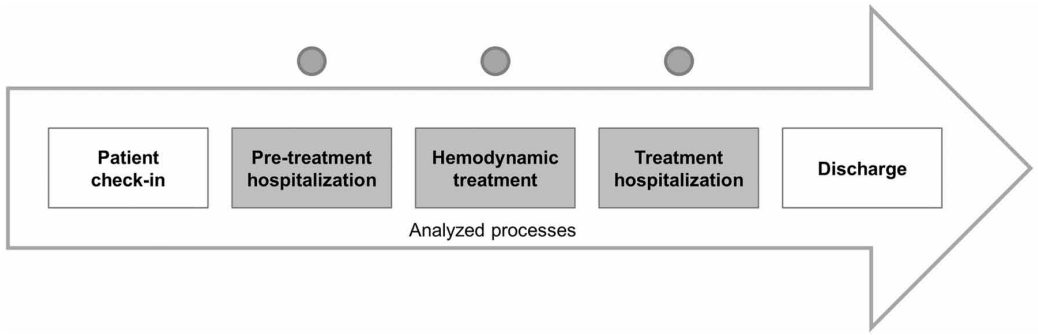
Once computed the amount of resources used within each cost pool, the project shifted its focus to the cost of single treatments. As already stated, the project aimed to measure the cost of only few medical treatments, due to the high level of technical complexity encountered (number and variability of treatments performed by the organizational units), and the time and cost constrains of the studies. More specifically, the attention of the research team shifted to the Clinic of Hemodynamics which deals with diseases related to the blood circulation. This clinic performs about 1,800 treatments per year, highly differentiated by nature and complexity, classified in the following three categories, in order of growing immediateness of action required: electives, urgencies, and emergencies.

The study focused on the measurement of costs attributable to the activities performed within the Cardiology Unit. In particular, the analysis concerned three specific treatments: coronarography, percutaneous transluminal coronary angioplasty (PTCA) and coronarography followed by PTCA which correspond to different DRG (Diagnosis-Related Group). The following step consisted in defining the flow of the activities performed within the organizational units analysed, in order to determine the cost of the objects identified. At the present stage, the analysis of the activities was confined to those performed in the chosen units, whereas, in more advanced stages of the project, it would be advisable to extend the analysis to interactions arising among different Departments.

Figure 5 illustrates the main activities that compose the therapeutic and diagnostic processes in case of to the elective (i.e., scheduled) treatments:

As shown in Figure 5, the process for elective cases starts with patient check-in and pre-hospitalization tests. Then, pre-treatment hospitalization, medical treatment (diagnostic and/or therapeutic), and treatment hospitalization follow. After discharge, the protocols usually require a set of post-dismissal controls. The above chart illustrates the standard procedure in the Clinic; in reality, the processes may show considerable deviation from the norm, depending on the results of the procedures performed, or on the specific conditions of the patients. The process flow changes dramatically in cases of emergencies, when the entire procedure is started by emergency room or ambulance personnel. The analysis performed by the research team involved the entire personnel belonging to the Clinic, and identified different types of

Figure 5. Process flow of elective treatments



procedures, differentiating among elective, urgency, and emergency treatments. Table 1 summarizes the volume of single treatments analyzed, grouped by category.

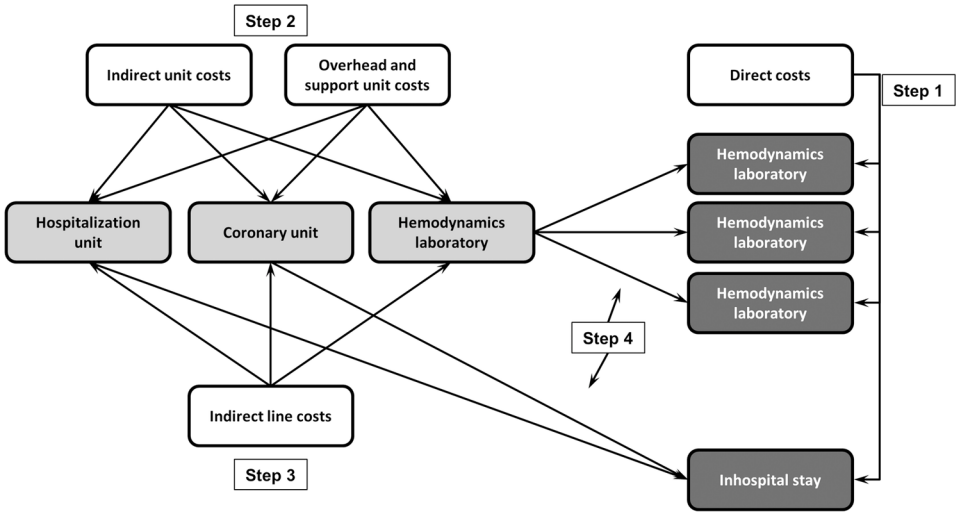
The cost attribution process that was developed within the Clinic of Hemodynamics for the three medical treatments previously mentioned (coronarography, PTCA, coronarography+ PTCA) is shown in Figure 6.

The first step in the four-stage cost allocation process developed by the research team required the determination of costs specifically attributable to the three cost objects (i.e., the processes corresponding to the three single treatments analysed). Direct costs consist of drugs, medical and general materials, linens, laboratory analyses and other diagnostic treatments provided by other departments. The precision of these measurements is assured by the availability of accurate record keeping activities performed by the personnel and gathered in specific databases used within the unit. Where necessary, missing data were collected (measuring the standard usage ratio of each resource consumed) and summarized in an appropriate bill of material for each treatment. The amount of these costs is approximately €350 for coronarography, €1,225 for PTCA without coronarography, and €1,484 for coronarography followed by PTCA.

Table 1. Volume of treatments analyzed

	Number of Treatments Analyzed	**Average Time (Minutes)**
Coronarography	938	88.0
Angioplasty without coronarography	40	96.7
Coronarography followed by angioplasty	554	120.8
Other treatments performed	254	141.6
Total number of treatments performed	**1,786**	**106.0**

Figure 6. The logic of cost allocation in the cardiovascular department



In step 2, indirect unit and overhead costs were traced to the functional cost pools, according to specific resource drivers. The most important overhead cost was certainly represented by personnel costs, which amounted approximately to €7 million per year, corresponding to 134 full-time equivalent workers. The resource driver chosen in this case was a duration driver, derived by the analysis of personnel average shifts. Starting from the yearly cost data available from the traditional cost accounting system, it was possible to trace personnel expenses to each functional cost pool using as a driver the time dedicated by the different professional figures (physicians, nurses, physiotherapists, and technicians) to each cost pool. Temporary shifts of personnel among different cost pools were also accurately recorded, in order to obtain precise cost measures. Table 2 illustrates the time and cost data details relevant to this attribution process.

It should be noted that data reported in the previous table represent, by themselves, a noteworthy result for the Hospital's management made possible by the thorough organizational analysis performed by the team. From a cost measurement point of view, the high level of detail of the analysis allowed us to identify the precise mix of activities performed by different professional figures, and, therefore, to compute the accurate cost of resources utilized.

The remaining overhead costs consisted of depreciation, maintenance, cleaning, laundry, utilities, garbage disposal, security, EDP, and other indirect costs. Within this class, there are also consumables of indirect usage (medical and non-medical), and intermediate care and medical services not included in the previously mentioned bill of materials. These costs are classified as indirect because of some limits of the current Hospital information system, which does not provide the detailed information needed in order to trace them directly. The amount of this various resources usage had been attributed to the functional cost pools using the same traditional allocation basis employed by the Hospital cost system to assign these costs to the responsibility cost units. In step 3, the indirect line costs (e.g., depreciation of medical equipment, depreciation of furniture, and costs used by the different line for multiple procedures) have been determined and charged to the different lines. The results of the second and third steps are reported in Table 3.

The cost of hospitalization (step 4) was attributed to the cost objects by means of a driver represented by the number of days of hospitalization. This choice constituted a deliberate simplification assumed by the project team in order to contain the complexity of the cost measurement process when the project was being initially developed. In fact, to provide more precise cost information, it would be possible to apply resource drivers capable of capturing the different complexity and length of the treatments performed in favour of the hospitalized patient, and, therefore, the intensity of the resource consumption. The management of the Hospital is aware of the measurement error deriving by this choice, and is currently pondering the use of more informative drivers, similar to those described above. Table 4 illustrates the relative importance of resource usage for ordinary hospitalization and for coronary unit hospitalization (intensive care), and provides information about the average cost arising from combining the two classes of cost. It should be emphasized that the use of an average cost measures such as these can lead to cross-subsidization effects among treatments requiring different levels of care.

Table 2. Time and cost data of the different activity lines

	Total			Profile											
				Physicians			Nurses			Physiotherapists			Administratives and Technicians		
Activity lines	**Hours**	**Weight (%)**	**Costs (€)**	**Hours**	**Weight (%)**	**Costs (€)**	**Hours**	**Weight (%)**	**Costs (€)**	**Hours**	**Weight (%)**	**Costs (€)**	**Hours**	**Weight (%)**	**Costs (€)**
Coronary Unit	1,037	27.2	2,198,719	183	23.7	653,301	818	33.3	1,506,159	36	33.3	39,259			
Hospitalization unit	1,022	26.8	2,036,893	213	27.6	762,065	773	31.5	1,235,569	36	33.3	39,259			
Hemodynamics lab.	375	9.8	977,522	114	14.8	425,618	225	9.1	516,573				36	7.5	35,331
Electrophysiology lab.	146	3.8	250,979	38	4.9	135,955	36	1.5	44,362				72	15.1	70,662
Cardiac dysrhythmia amb.	49	1.3	89,621	13	1.6	45,259	36	1.5	44,362						
Cardiomyopathy amb.	61	1.6	104,876	13	1.6	45,259	48	2.0	59,618						
Divisional amb.	48	1.3	87,653	12	1.6	43,291	36	1.5	44,362						
Electrocardiography amb.	48	1.3	87,653	12	1.6	43,291	36	1.5	44,362						
Ergometry amb.	7	0.2	16,252	3	0.4	11,914	4	0.1	4,338						
Holter amb.	72	1.9	80,265	0	0.0	572	36	1.5	44,362				36	7.5	35,331
Pacemaker amb.	110	2.9	224,679	38	4.9	135,955	72	2.9	88,724						
Heart failure amb.	67	1.8	127,595	19	2.5	67,978	48	2.0	59,618						
Rehabilitation amb.	292	7.7	448,542	40	5.2	143,111	216	8.8	266,172	36	33.3	39,259			
Ecocardiography	218	5.7	424,141	74	9.6	264,755	72	2.9	88,724				72	15.1	70,662
Secretary	261	6.8	112,298										261	54.7	112,298
Total	**972**	**100.0**	**1,691,278**	**224**	**100.0**	**801,385**	**604**	**100.0**	**744,641**	**36**	**100.0**	**39,259**	**108**	**22.6**	**105,992**

Table 3. Indirect costs charged to the different units

Cost Voices	Cardiology Unit Costs (€)	Macro-Activity Line Costs (€)			
		Hospit. Unit	Coronary Unit	Hemodynamics Laboratory	Other Lines
Physicians and nurses	7,155,392	2,036,893	2,198,719	977,522	1,942,257
Other personnel	112,298	32,312	32,777	11,847	35,362
Materials	61,547	36,114	25,433		
Chemical tests, radiological tests	942,529	553,043	389,486		
Instruments, furniture	743,515	50,163	133,358	402,031	157,964
Inpatient meals	202,722	152,216	50,506		
Laundry services and related supplies	371,013	84,140	72,819	19,747	194,307
Cleaning services	248,772	58,991	82,298	26,788	80,695
Overhead costs	1,965,896	605,962	567,085	167,648	625,202
Total	**11,803,684**	**3,609,834**	**3,552,481**	**1,605,582**	**3,035,787**

Table 4. Comparison of costs of ordinary hospitalization and intensive care (Coronary unit)

Cost Voices	Hospit. Unit	Coronary Unit	Total (€)
Physicians and nurses	2,036,893	2,198,719	4,235,613
Other personnel	32,312	32,777	65,089
Materials	36,114	25,433	61,547
Chemical tests, radiological tests	553,043	389,486	942,529
Instruments, furniture	50,163	133,358	183,520
Inpatient meals	152,216	50,506	202,722
Laundry services and related supplies	84,140	72,819	156,959
Cleaning services	58,991	82,298	141,289
Overhead costs	605,962	567,085	1,173,046
Total costs	**3,609,834**	**3,552,481**	**7,162,315**
Total days of confinement	10,235	2,196	12,431
Total Day Hospital accesses	883		883
Total	**11,118**	**2,196**	**13,314**
Cost per day	**325**	**1,618**	**538**

In the final step (4), activity drivers were also applied in order to trace the amounts of resources used within the Hemodynamics cost pool to serve the two cost objects considered. In this case the team decided to use a time driven method. As an example, for medical personnel cost, the activity driver was linked to the standard duration of the treatment, and was so calculated:

$$Cost\ of\ personnel \times \frac{Avg.\ total\ time\ needed\ for\ the\ treatment}{Total\ surgery\ room\ hours\ available}$$

The Department has two surgery rooms devoted to Hemodynamics treatments. Their production capacity was determined as the sum of the hours of programmed activities (seven hours per day, five days a week – holidays excluded) and the hours necessary for facing emergencies). The second addendum was assessed considering the number of hours in which the four specialized cardiologists working for the Department are normally required to be available for emergencies. The organizational analysis, developed by the research team in order to assess the impact of the personnel shifts on the level of production, has revealed the high level of efficiency achieved in the management of the resources. As a matter of fact, the existence of unused capacity is fully justified by the necessity to grant the immediateness of treatment to emergency cases (15% of the annual number of treatments), and by the relevant number of urgency cures performed by the unit (44% of the annual cases), for which, of course, no planning is possible.

The high incidence of urgency and emergency treatments can be explained by the "hub" role played by the Hospital within its surrounding reference area (provinces of Trieste and Gorizia, with a total population of 376,500 inhabitants). It is worthwhile to observe that the above described production capacity was measured in terms of theoretical capacity, whereas ABC authors normally suggest the use of practical capacity (Cooper & Kaplan, 1998, p. 112; Kaplan & Anderson, 2007, p. 52-54), such as the maximum level at which an organization can operate efficiently, net of unavoidable operating interruptions, such as repair time or waiting time. This choice was made for streamlining the cost measurement process, and was also applied to the two following case studies.

In addition to cost of personnel, the above reported activity driver was deemed suitable to trace most of other cost items, including equipment, laundry services, secretarial costs, utilities, management of human resources, cleaning services, waste disposal services, heating and conditioning, security, legal services, IT services, etc. For some of these costs, the driver adopted does not fully reflect the cause and effect relationship between the usage of the resource and the service provided. However, the measurement error thus introduced has been considered not relevant, while the benefits arising from streamlining the cost measurement process have been reputed significant. A second class of drivers, based on the amount of the supplies or drugs used, was instead applied, respectively, to administrative and purchase costs, and to hospital pharmacy costs. In line with the methodology initially proposed by Cooper and Kaplan (1992, p.3), according to whom the cost measurement system must be designed in order to respect the following equation:

Activity availability = Activity usage + Unused capacity

The cost model designed by the team separates the costs of unused capacity referring to the Hemodynamics clinic from the total of the costs attributable to the treatments. The costs of unused capacity, that, in this context, can be aptly described as the costs caused by "readiness to perform", have been estimated as 23% of total costs. As previously mentioned, this amount can be considered moderate, due to the degree of optimization achieved in the use of human resources. Table 5 reports the non-specific costs (total and per unit), resulting from the cost measurement process developed in the Cardiology department, when applied to the cost objects selected for this study.

Table 5. Total and per-unit indirect costs of the different treatments

Cost Voices	Hemodynamics Laboratory Costs (€)								
	Total	Coronarography		PTCA		Coronarography Followed by PTCA		Other	Unused Capacity
		Total	Unit	Total	Unit	Total	Unit	Total	
Physicians and nurses	977,522	328,804	351	15,408	385	266,581	481	143,268	
Other personnel	11,847	3,985	4	187	5	3,231	6	1,736	
Instruments, furniture	402,031	135,229	144	6,337	158	109,638	198	58,923	
Cleaning services	26,788	9,011	10	422	11	7,305	13	3,926	
Laundry and related supplied products	19,747	6,642	7	311	8	5,385	10	2,894	
Overhead costs	167,648	47,695	51	2,997	3	50,019	53	29,137	
Total	**1,605,582**	**531,366**	**566**	**25,661**	**570**	**442,159**	**761**	**239,885**	**366,512**
Procedure weight	***1.00***	***0.44***		***0.02***		***0.35***		***0.19***	
Unused capacity cost		**159,816**	**170**	**7,489**	**187**	**129,572**	**234**	**69,635**	
Indirect costs		**691,181**	**737**	**33,150**	**757**	**571,731**	**995**	**309,520**	

As shown in the above table, after separating the cost of unused capacity from the cost of the activities performed, the management of the Hospital decided to attribute this cost to the single treatments to compute their full cost. This choice arises from considering this portion of capacity not as an inefficiency, but rather as a constraint imposed by the peculiarities of healthcare services performed by governmental entities which need to be ready to properly face urgencies and emergencies. This requirement, from an economic point of view, is reflected in an increase of the average cost for the average intensity (elective, urgent, and emergent) with which the treatments are provided. The intensity of the treatment, therefore, drives the intensity of resource usage. However, it should be noted the cost of unused capacity has been allocated to the treatments on the basis of their volume, thus employing a transaction driver, not a duration or intensity driver.

The final results of the cost measurement process are summarized in the following tables. Column number 3 of Table 6 reports the amounts of specific costs determined in step 1 of the process, while column 4 summarizes the combined results of steps 2, 3 and 4. The total cost of each procedure is therefore determined by the sum of its direct and indirect costs. Table 7 instead summarizes the average cost for hospitalization.

Considering jointly the data provided by Tables 6 and 7, it is possible to determine the standard cost of various kinds of treatments performed arising from the combination of the variables considered (type of treatment, and length and type of hospitalization). This leads to different cost levels for each type of treatment, depending on the length and on the kind of hospitalization required. It is also possible to calculate average cost figures for recurring classes of treatments. For example, in the case of coronoragraphy followed by angioplasty, out of 544 observed instances, 494 were treated exclusively within the Cardiology department; therefore the cost of hospitalization reported in Table 4 is appropriate. The average hospitalization length for this treatment was 6.3 days, of which 1.5 in intensive care, leading to a total cost for the treatment as summarized in the Table 8.

Table 6. Unitary costs of the diagnostic and therapeutic treatments studied

	Number of Procedures (1)	Average Duration (Minutes) (2)	Single Procedure Direct Costs (3)	Single Procedure Indirect Costs (4)	Total Single Procedure Costs (5)
Coronarography	938	88.0	350	737	**1,087**
PTCA	40	96.7	1,225	757	**1,982**
Coronarography + PTCA	554	120.8	1,484	995	**2,479**
Total/average	**1,532**	**100.1**	**€783**	**€831**	**€1,614**

Table 7. Average unitary cost for hospitalization

	Hospitalization Unit	Coronary UNIT	Average
Cost of one day of hospitalization (€)	325	1.618	538

Case Study 2: Cost Measurement in Odontostomatology

The second case study is about the Dentistry and Stomatology Clinic within the Department of Specialist Surgery of the AOU (Azienda Ospedaliera Universitaria – Teaching Hospital) of Trieste, Italy. R. Di Lenarda, Chair of the Department of Medical, Surgical and Health Sciences at the University of Trieste and Head of the Dentistry and Stomatology Clinic at the AOU (Teaching Hospital) of Trieste, significantly contributed to the development of this case study. The authors are also thankful to A. Avanzini, who developed a master thesis on this topic (under the supervision of R. Di Lenarda, A. Rebelli, and G. Grisi) and to the entire staff of the Dentistry and Stomatology Unit.

The Clinic, which hosts a graduate program in Odontostomatology Surgery, has adopted an organizational model where teaching, research, and assistance to patients coexist. In this unit, in fact, the three activities produce tangible synergic benefits, as it will be explained in the course of this paragraph. The involvement of medical students in the activities of the clinic allows them to hone their skills, thanks to a learning by doing process, while simultaneously increasing the efficiency level of the treatments provided by the clinic. As a matter of fact, their presence allows the clinic to reach significant volumes of treatments, without a corresponding increase in personnel costs. Obviously, this model requires the constant presence of tutors who supervise the activities performed by the medical students, within the

Table 8. Total cost of a selected treatment, including hospitalization

Coronarography Followed by Angioplasty	Costs (€)
Procedure cost	2,479
Hospitalization unit cost	1,560
Coronary Unit cost	2,427
Total	**6,466**

boundary of their privileges, thus enabling the transfer of knowledge and competencies through field training.

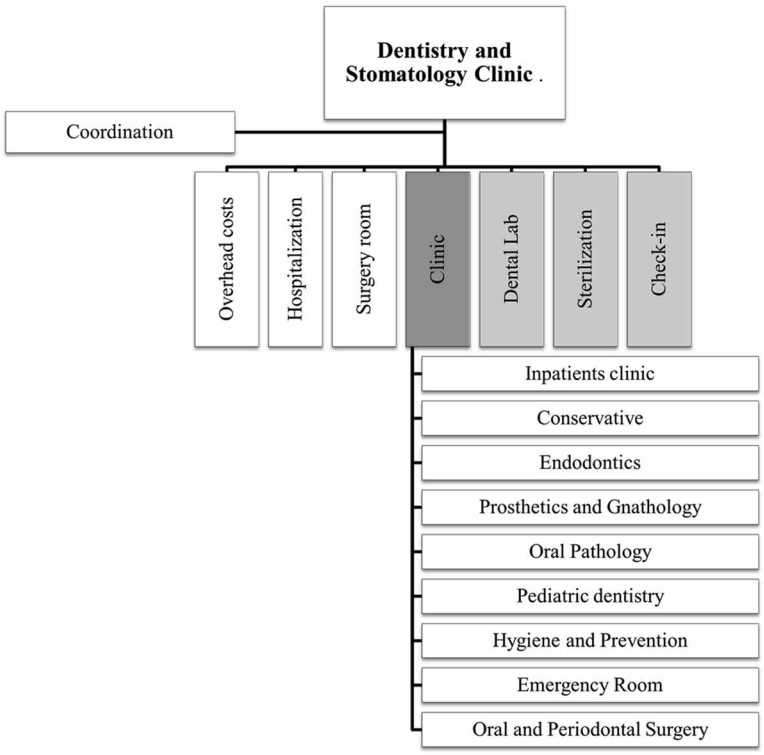
This case study outlines, on one hand, the process developed in order to compute the actual cost of the treatments performed within the clinic, and, on the other hand, the "what if" analysis done in order to appraise the "cost savings" granted by the organizational model above described. All the data collected refer to 2011.

Similarly to the previous case study, the project team undertook an in-depth analysis of the organizational structure of the clinic, in order to determine the macro-activities performed within the organization and to define the cost pools necessary to the cost allocation process. Figure 7 illustrates the cost pools identified as a result of this first stage of the research.

The different cost pools, illustrated in Figure 7, mainly collect the costs of resources specifically used to perform the same set of activities. The cost of these resources was traced to the pertaining pools considering the specific usage of equipment and physical space. The same can be said for labor costs that were traced to the pertaining cost pools in accordance to the specific and rigorous schedule of personnel shifts adopted by the unit. In ABC terms, the parameters used to trace the resource costs to the cost pools are called resource drivers. Auxiliary clinic costs and overhead were attributed to the cost pool using traditional allocation bases.

Some cost pools (Hospitalization and Surgery room) aggregate cost of resources devoted to serve inpatients. The volume of the output performed by these resources, however, is negligible when compared to the main area of activities, constituted by ambulatory care. In fact, due to the importance of the latter,

Figure 7. Primary and auxiliary cost pools identified within the Clinic



the relative cost pool is detailed in more analytical, second-level, cost pools, corresponding to sets of activities grouped according to similarity in therapeutic characteristics and use of specific resources. Given the prevalence of ambulatory care, the case study focused on the costs of outpatient treatments. In order to compute their costs, however, it was necessary to determine the costs of ancillary services (Check-in, Dental Laboratory, and Sterilization), which were consequently aggregated in specific cost pools. These costs were eventually allocated to the primary cost pools. The cost pool called "Overhead cost" is a mere aggregate of indirect costs that could not be correctly attributed to other cost pools, and it was mainly created for practical reasons.

Table 9 illustrates the relations existing among the cost pools and the volume of selected treatments (described as activities in the ABC terminology) performed by the resources that belong to the cost pools, highlighting how the same treatment can be performed using resources pertaining to different cost pools.

The measurement of the costs specifically attributable to each treatment (mainly constituted by materials and medicines) was a difficult, yet essential, stage of the research process. The complexity of this endeavor was mainly due to the lack of detailed databases in the hospital information system. As a matter of fact, the only information available was the total amount of materials and drugs consumed in the reporting period, divided in five main categories. A Bill of Material (BOM) for each treatment was therefore prepared, thanks to the direct involvement of medical and clinical staff. However, only the most relevant costs were considered in the BOM, while the residual material costs were attributed to the treatments using a volumetric cost allocation basis.

As previously mentioned, the cost measurement process developed by the team required, in this case, the preliminary determination of the costs of ancillary services. Three auxiliary cost pools were therefore identified (Dental Laboratory, Sterilization, and Check-in). The amounts so determined were then allocated downward to the principal cost pools. In one instance the entire cost of the auxiliary cost pool (Dental Laboratory) was traced to a single primary cost pool (Dental Prosthetics and Gnathology), because the totality of the outputs of the former was used as inputs by the latter. In all other cases, the costs were traced to the primary cost pools by means of traditional, yet appropriate, drivers. The organizational structure of this Clinic is characterized by the presence of a check-in service internal to the unit, whereas other hospital departments generally rely on a centralized check-in system. Consequently, the cost of the treatments determined in this case, unlike the costs calculated for the Hemodynamics clinic, also includes the cost of the resources used to perform this activity. Table 10 shows the results of the allocation of the costs of the auxiliary centers to the primary centers.

Once the full amount of costs pertaining to the primary cost pools was determined, these costs were traced to the single treatments using activity drivers differentiated between personnel cost and other fixed costs. An intensity driver (time needed for performing each single treatment) was chosen in order to trace the personnel costs (previously attributed to the cost pools) to each treatment. The reason for employing an intensity driver lay in wanting to place the right emphasis on the different costs deriving from the use of personnel with different skills and wages. As a matter of fact, the intensity driver chosen was determined by combining data regarding the time needed to perform a task by different categories of personnel and their hourly cost. The other costs were mainly attributed using duration drivers.

Quantifying the time needed for the different treatments was another complex task faced by the project team, since such measurements had never been attempted before in the organization. Moreover, in order to determine the intensity driver needed to trace the personnel costs, the average time for performing a treatment was measured for each category of personnel involved (physicians, nurses, medical students, etc.). For this purpose, each treatment was divided into three different phases: 1) preparation of the

Table 9. Volumes and descriptions of selected treatments provided by the different cost pools

Cost Pool Treatment	Inpatients Clinic	Conservative	Endodontics	Prosthetics and Gnathology	Oral Pathology	Pediatric Dentistry	Hygiene and Prevention	Emergency Room	Oral and Periodontal Surgery	Total
Visit	195	202	33	920	1,331	939	730	9,348	696	**14,387**
Dental restoration	7	9,512	242	0	113	1,520	8	343	48	**11,793**
Dental radiograph	188	1,307	2,734	9	372	424	1,842	7,157	450	**14,479**
Small suture	193	8	50		324	14	7	1,064	4,357	**6,017**
Removal of therapeutic devices	144	43	43		340	39	27	492	3,610	**4,738**
Dental prosthesis				444						
Extraction	192	5	49	0	337	220	7	1,020	4,385	**6,215**
Wound irrigation		809	233		47	58	626	1,084	41	**2,898**
Root smoothing	27	5			4		2,436	18	19	**2,509**
Other	128	318	1,203	125	967	1,492	5,393	920	946	**11,947**
Total volume	**1,074**	**12,209**	**4,587**	**1,498**	**3,835**	**4,706**	**11,076**	**21,446**	**14,552**	**74,983**

Table 10. Allocation of the auxiliary cost centers to the primary cost centers

	Total costs (€)	Primary Cost Centers								
		Emergency Room	Pediatric Dentistry	Conservative	Prosthetics and Gnathology	Endodontics	Oral Pathology	Oral and Periodontal Surgery	Hygiene and Prevention	Inpatients Clinic
Costs before allocation	**2,762,079**	**446,176**	**127,753**	**282,687**	**140,443**	**140,990**	**126,519**	**186,642**	**151,551**	**73,658**
Sterilization	**214,202**	36,605	15,434	40,408	3,556	11,509	9,771	60,488	33,113	3,317
Dental Laboratory	**96,568**	0	0	0	96,568	0			0	0
Check-in	**213,193**	0	19,124	49,614	6,087	18,640	15,584	59,135	45,009	0
Overhead costs	**343,367**	98,207	21,550	55,908	6,860	21,005	17,562	66,637	50,720	4,918
Costs after allocation	**3,629,409**	**580,988**	**183,861**	**428,617**	**253,514**	**192,144**	**169,436**	**372,902**	**280,393**	**81,893**

patient and of the necessary devices; 2) treatment; 3) cleaning and reset of the dental unit. Physicians are rarely involved in the first stage, and never in the third. The methodology adopted does not allow for the separation of the cost of unused capacity that is, therefore, attributed to the treatments. The cost allocation process is summarized in Figure 8.

As shown in Figure 8, the various primary activity cost pools may perform the same treatments; therefore, their cost may vary depending on where it is performed. For this reason, the project team deemed necessary to calculate the average cost of each treatment.

When designing this cost measurement model, it was decided to take into account only the actual costs incurred by the hospital. The cost of medical students, who do not receive a salary from the hospital, therefore, does not affect the cost calculation process described above. This choice was consciously taken by the project team, in order to fully appreciate the cost containment effects generated by this particular form of organization. As an example of the data produced by the cost measurement implemented, Table 11 shows the cost of selected treatments performed using the resources pertaining to a specific cost pool (Oral and Periodontal Surgery).

In the subsequent phase of the project, the research team developed a simulation aimed to quantify the cost containment effects generated thanks to the involvement of medical students in the processes analyzed. In the previous phase of the process, costs were calculated employing what could be described as a "top-down" approach. In fact, the starting point for the calculations was represented by the total costs incurred by the hospital for the physicians employed in the Dentistry and Stomatology Clinic, which was then traced to the different cost pools, as shown in Table 12.

The simulation employed a "bottom-up" approach, attempting to estimate the total cost of the physicians necessary to perform the same set of activities offered by the Clinic, starting from the standard

Figure 8. Cost allocation process in the Dentistry and Stomatology Clinic

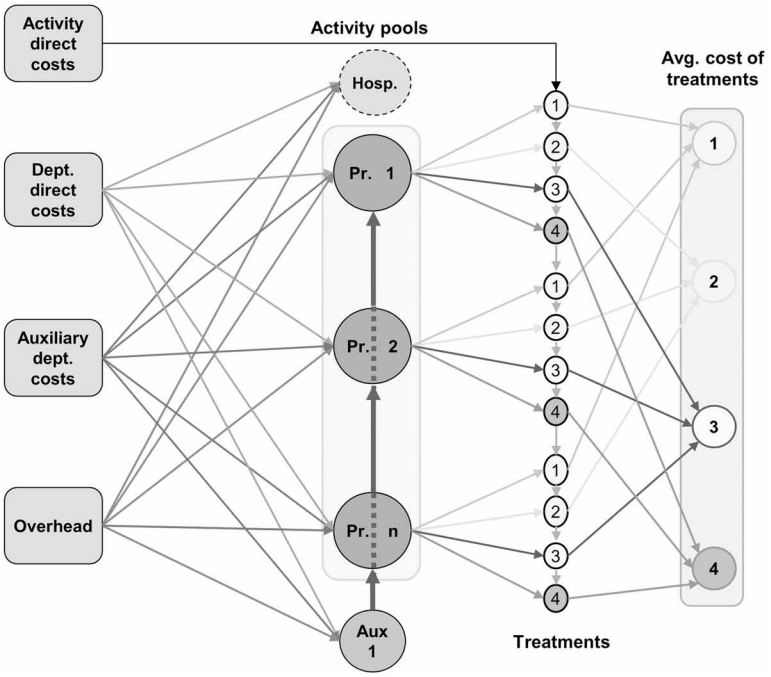


Table 11. Total and per-unit costs of selected treatments performed by the Oral and Periodontal Surgery cost pool

Treatment	Qty	Cost (€)	
		Total	Per Unit
Small suture	4,357	96,498.96	22.15
Removal of therapeutic device	3,610	56,066.48	15.53
Extraction of permanent tooth	2,330	77,789.96	33.39
Extraction of residual root	1,698	61,433.77	36.18
Short visit	444	8,805.39	19.83
Removal of dental prosthesis	389	7,014.84	18.03
Surgical tooth extraction	350	19,251.69	55.00
Gingivectomy	295	20,560.68	69.70
Intraoral radiograph	273	4,165.44	15.26
Specialist visit	252	6,376.66	25.30
Ortopantomograph	177	2,787.71	15.75
Dental scaling and root planing	49	1,677.25	34.23
Other wound irrigation	41	738.32	18.01
Treatment of stomatitis	30	893.07	29.77
Dental restoration through filling – up to 2 layers	23	1,074.98	46.74
Pre-prosthetic surgery	22	598.34	27.20
Dental restoration through filling – more than 2 layers	21	1,040.17	49.53
Removal of oral lesion	20	712.88	35.64
Root smoothing	19	674.14	35.48
Oral swab	16	253.11	15.82
Oral biopsy	16	525.32	32.83
Removal of internal fixator	13	501.62	38.59
Other dental repair (selective polishing)	13	428.72	32.98
Removal of gingival tissue	9	224.82	24.98
Gingival biopsy	9	295.49	32.83
Gingivoplasty	8	217.27	27.16
Crown reapplication	8	155.23	19.40
Extraction of deciduous tooth	7	200.54	28.65
Osteoplasty	7	311.75	44.54
Apicoectomy	6	269.42	44.90
Removal of mandibular dental lesion	5	305.80	61.16
Splinting	5	236.02	47.20
Tooth polishing	4	85.09	21.27
Temporary filling	4	73.92	18.48

Table 12. Simulated "bottom up" approach in the calculation of physician costs in the Dentistry and Stomatology Clinic

Cost Pool	Actual Costs ("Top Down" Approach) (€)	Number of Physicians Necessary on the Basis of the Volume of Output	Annual Average Cost of a Physician (€)	Simulated Costs Based on Output ("Bottom Up" Approach) (€)
Emergency Room	91,785.51	2.93	84,005	245,879.92
Pediatric dentistry	36,714.21	0.93	84,005	78,227.59
Conservative	45,892.76	3.87	84,005	324,982.31
Prosthetics and gnathology	59,856.04	0.64	84,005	54,097.05
Endodontics	45,892.76	1.34	84,005	112,852.77
Oral Pathology	45,892.76	0.82	84,005	68,899.35
Oral and Periodontal Surgery	64,249.86	2.87	84,005	241,207.88
Hygiene and Prevention	45,892.76	4.59	84,005	385,803.49
Inpatients clinic	18,357.10	0.21	84,005	17,390.07
Total	**454,533.74**	**18.21**	**84,005**	**1,529,340.41**

costs of the treatments. The first step consisted in determining the per-minute cost of medical staff. The yearly average cost of physicians was, therefore, divided by the number of average minutes worked, resulting in a per-minute cost of physicians of approximately €1. On the basis of the standard time of each treatment (measured in the first phase of the project), the research team then calculated the total minutes necessary to perform the various treatments offered within the Clinic. This approach allowed for the attachment of a value to the activities performed by medical students as if they were physicians employed by the hospital. The results of the simulation are reported in Table 12, and show a considerable difference in financial resources needed, in this hypothesis, in order to offer the same set and volume of treatments. The above described simulation, although based on extremely simplified assumptions, still offers valuable contributions to a better understanding of the economic benefits arising from this peculiar method of organizing the delivery process of the treatments.

Case Study 3: Cost Analysis of Computed Tomography

The third case study, building on previous experiences of cost measurement in radiology (Stacul et al., 2006; 2009), was developed within the Radiology department of the Teaching Hospital of Trieste, which offers specialist radiological treatments grouped in the following areas: interventional radiology, echography, nuclear magnetic resonance, and computed tomography. M.A. Cova, Chair of the Radiology Department at the AOU (Teaching Hospital) of Trieste significantly contributed to the development of this case study, along with R. Cuttin, F. De Grassi. The authors are also thankful to V. Tolot, who developed a master thesis on this topic (under the supervision of M.A. Cova, A. Rebelli, and G. Grisi) and to the entire staff of the Radiology department.

A specific cost pool was designed for each of the specialties previously listed. The project, however, primarily focused on the analysis of the cost drivers relevant for the computed tomography (CT) treatments.

In fact, the department recently invested in new CT equipment, thus expanding the set of diagnostic treatments offered and the volume of activities performed. All the data collected in this study refer to 2012.

A particular emphasis was placed on *time* as the main determinant of the costs for CT, because the treatment is also performed under conditions of urgency. Given the high volume of treatments performed under those circumstances, it was not possible to staff the equipment using on-call personnel. Instead, it was necessary to have on-duty personnel available on site, in order to face emergency and urgency situations. This differentiates the organization of the Radiology department from the one of the Hemodynamic clinic, leading to a greater difference in costs between elective and urgency CT treatments, compared to the same difference calculated for the hemodynamics treatments.

The methodology applied was developed along the following phases:

1. Organizational analysis aimed to identify:
   a. Different sets of resources devoted to perform the same type of specialist treatments (cost pools);
   b. Clusters of treatments, differentiated by type and conditions of performance (elective/urgency).
2. Definition of costs specific to each cluster (mainly consumable material costs).
3. Designation of appropriate resource drivers and other cost allocation bases needed in order to trace or allocate the overhead costs to the previously identified cost pools.
4. Definition of the proper activity drivers necessary for tracing the cost aggregated in the previous step to the different treatments.

The hospital cost accounting system aggregates all the financial information regarding the Radiology department in one single cost center, although the department is divided into two different subunits. Moreover, the level of analysis of data provided by the cost accounting system is not adequate for the aims of the project team. This led to some difficulties in gathering and analyzing all the necessary data, only overcome thanks to interfunctionality of the team.

With reference to phase 1b), seven types of CT treatments were initially identified:

1. CT angiogram,
2. Abdominal CT,
3. Neck CT,
4. Cranial CT,
5. Skeletal muscular CT,
6. Thoracic CT,
7. Urinary tract CT.

All the treatments listed above were differentiated upon the employment of a contrast medium (i.e., a substance used to enhance the contrast of structures or fluids within the body in medical imaging), since its use determines an increase in the time needed to perform the treatments, adding further medical procedures, otherwise unnecessary. Additionally, treatments were differentiated depending on whether the patient was internal or external (most, but not all, external patients are subject to elective treatments). This led to 28 theoretical clusters of treatments, subsequently reduced to 24 thanks to the elimination of some unlikely combinations (some treatments are only performed using a contrast medium). The clusters so identified represent the final cost objects selected by the research team. As previously mentioned, one

Table 13. Schedule of usage of CT equipment

	CT Section 1							
Time slot	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Holidays**
7:20am-2pm	Elective	Elective	Elective	Elective	Elective	Urgent	Urgent	Urgent
2pm-8pm	Urgent	Urgent	Elective	Urgent	Urgent	Urgent	Urgent	Urgent
8pm - 7:20am	Urgent	Urgent	Urgent	Urgent	Urgent	Urgent	Urgent	Urgent
	CT Section 2							
Time slot	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**	**Holidays**
7:20am-2pm	Elective	Elective	Elective	Elective	Elective	---	---	---
2pm-8pm	Elective	Elective	Urgent	Elective	Elective	---	---	---
8pm - 7:20am	---	---	---	---	---	---	---	---

relevant factor influencing the amount of costs of the treatments is represented by the use of resources during night and holiday shifts, according to the work organization adopted by the unit, which requires the presence of personnel on-duty during those periods. As it will explained later, this factor influences the amount of available capacity and, therefore, the cost of the treatments performed under urgency regimes.

CT scans are performed using two separated sets of resources (CT machines and physical spaces), called "sections" from now on, with a total output of approximately 21,000 treatments per year. Table 13 shows time schedule for the two groups of resources:

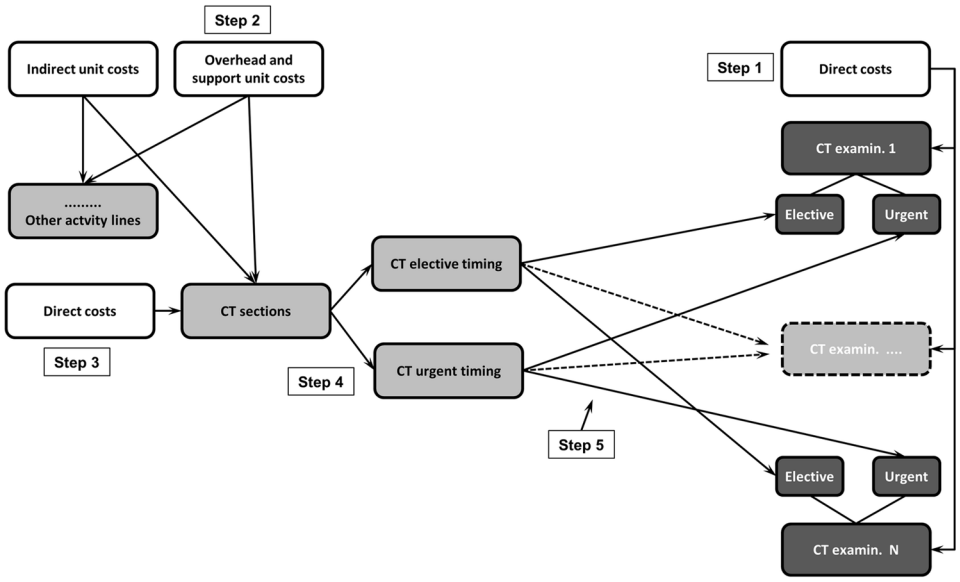
As shown in Table 13, the two sections do not always operate at the same time. Section 1 is operational 24 hours a day, 7 days a week, whereas section 2 does not work at nights and on weekends and holidays (although it is sometimes used as a backup facility during downtimes of section 1). Therefore, the total capacity is compounded considering the working hours of the two sections combined, including both personnel and equipment. The greater level of costs caused by urgencies (due to the necessity of having resources available for a longer period of time) and the different rates of utilization of capacity during urgencies (due to the more efficient saturation attainable for elective treatments), make particularly important differentiating the cost of the treatments in reference to this attribute of the activity. In cost accounting literature, attributes are coding schemes associated with each activity that facilitate reporting of activity cost (Kaplan & Cooper, 1998, p. 92). For this reason, determining the per-unit cost of each section was considered less relevant. Moreover, the different equipment used by the two sections, characterized by different levels of efficiency, could lead to different levels of cost per treatment, without any relevance from an economic point of view, since the use of different equipment does not appear to be linked to a deliberate choice.

Figure 9 illustrates the steps undertaken for measuring the cost of CT treatments provided by the unit.

Figure 9 highlights the following steps:

1. Costs of materials are traced to the treatments (step 1).
2. Indirect and overhead costs are attributed to different cost pools, including the one relevant for our analysis (CT), using resource drivers and appropriate allocation bases (step 2).
3. Costs directly referring to a single cost pool are traced to it (step 3).

Figure 9. Steps of the cost measurement process for CT treatments



4. Costs of the CT cost pool are differentiated between operating hours dedicated to elective treatments and hours needed to face demand of treatments arising from urgencies (step 4). Naturally, the resource driver used in this step was a duration driver.
5. Costs pertaining to each cost pool are traced to the treatments, by means of an activity driver also represented by a duration driver.

Table 14 shows the direct costs of the treatments, typically consumable materials.

Table 14. Direct costs of the CT treatments

Treatment	With/Without Contrast Medium	Cost of Direct Materials (€)
CT angiogram	With contrast	30,4
	Without contrast	0,9
Abdominal CT	With contrast	29,8
	Without contrast	0,9
Neck CT	With contrast	29,4
	Without contrast	0,9
Cranial CT	With contrast	29,4
	Without contrast	0,9
Skeletal muscular CT	With contrast	29,4
	Without contrast	0,9
Thoracic CT	With contrast	29,4
	Without contrast	0,9
Urinary tract CT	With contrast	29,7

As a result of the activities performed in step 2, Table 15 reports costs of personnel, divided by category, for the CT cost pools and for the other pools combined.

Table 16, reports, for all the clusters of treatments considered, the volume of output and the per-unit cost figures obtained as the final outcome of the cost measurement process here described.

The ratio between the volume of urgent and elective treatments is 3:4, while the ratio between their respective costs varies from 1.8 to 2.1, depending on the treatment. The same cost ratio, when calculated taking into consideration the average cost for each of the two classes of treatment, decreases to 1.5 due to the greater weight of elective treatments (characterized by a lower per-unit cost). The management of the hospital reputes that the ratio of 1.5 represents a valid measure of the different intensity in the consumption of the resources between urgent and elective treatments. The average cost per treatment, calculated ignoring the attribute of urgency, is approximately equal to €126. It is therefore evident the measurement error it conveys, since it underestimates (by €31, or 19.7%) the cost of urgent treatments, and overestimates (by €24, or 23.6%) the cost of elective treatments. The size of the error demonstrates how insidious comparisons may be, when made between structures devoted uniquely to elective treatments and structures that, instead, also need to face urgencies. In particular, comparisons are improper when conducted in terms cost per unit (i.e., on the basis of volumetric terms). Such calculations, in fact, do not allow to adequately consider the greater complexity (and, therefore, the increase in costs) deriving from the delivery of urgent treatments.

The differentiation between internal and external patients, instead, did not lead to uniform and significant variances in cost figures. An additional step in the analysis could consist in further detailing the diagnostic treatments, achieving a more precise and accurate measurement of times.

FUTURE RESEARCH DIRECTION

The methodology applied in the previous case studies allowed to identify a unitary framework for organizational analysis and cost measurement, developed within the Teaching Hospital of Trieste. This framework is susceptible to be

Table 15. Cost of personnel divided by category in Radiology cost pools

	All Personnel			Physicians			Nurses			Technicians			Other Personnel		
	Avg, Weekly Hours	%	Total Cost (€)	Avg, Weekly Hours	%	Total Cost (€)	Avg, Weekly Hours	%	Total Cost (€)	Avg, Weekly Hours	%	Total Cost (€)	Avg, Weekly Hours	%	Total Cost (€)
CT pool	568	24.4%	1,302,761	174	28.8%	689,056	144	26.7%	181,795	250	22.9%	431,910	0	0.0%	0
Other pools	1.756	75.6%	3,790,574	430	71.2%	1,701,182	396	73.3%	504,334	841	77.1%	1,448,907	108	100.0%	136,152
Total	**2.324**	**100.0%**	**5,093,335**	**604**	**100.0%**	**2,390,237**	**540**	**100.0%**	**686,129**	**1.091**	**100.0%**	**1,880,817**	**108**	**100.0%**	**136,152**

Table 16. Final per-unit cost figure, divided by type of CT scan, origin of patient, and timing of the treatment (elective/urgent)

Treatment	Origin of Patient	Contrast Medium (CM)	Urgent		Elective		Total/Average	
			Volume	Per-Unit Cost (€)	Volume	Per-Unit Cost (€)	Volume	Per-Unit Cost (€)
CT Angiogram	External	With CM	4	314	695	162	699	163
		Without CM						
	Internal	With CM	567	323	753	166	1,320	233
		Without CM						
Abdominal CT	External	With CM	16	283	904	149	920	151
		Without CM	1	160	127	76	128	76
	Internal	With CM	972	270	1,335	142	2,307	196
		Without CM	245	159	185	75	430	123
Neck CT	External	With CM	4	259	148	138	152	142
		Without CM	1	134	1	64	2	99
	Internal	With CM	19	239	73	128	92	151
		Without CM	4	133	8	63	12	86
Cranial CT	External	With CM	7	183	310	103	317	105
		Without CM	6	113	469	55	475	56
	Internal	With CM	245	186	508	104	753	131
		Without CM	5,527	113	3,321	54	8,848	91
Skeletal muscular CT	External	With CM			17	104	17	104
		Without CM	2	154	229	73	231	74
	Internal	With CM	65	290	65	152	130	221
		Without CM	1,320	155	828	73	2,148	123
Thoracic CT	External	With CM	18	243	459	131	477	135
		Without CM	5	130	128	62	133	64
	Internal	With CM	278	237	750	127	1,028	157
		Without CM	104	129	494	60	598	72
Urinary tract CT	External	With CM	1	385	124	197	125	199
		Without CM						
	Internal	With CM	3	377	73	191	76	199
		Without CM						
Total/Average			**9,414**	**157**	**12,004**	**102**	**21,418**	**126**

applied to other units of the hospital in order to fully appreciate differences in cost of treatments arising from complexity in the activities performed and different use of available resources. Information so generated should be subsequently employed to develop new forms of organizations capable of reducing the level of process complexity (without affecting the volume and the quality of the care provided), and the amount of unused capacity. In order to improve the performance levels of healthcare processes it is indispensable to transcend departmental boundaries. Cost reductions and performance improvements, in fact, can only be achieved through reconfiguring treatment processes, adopting what Cokins (2001, p. 38) calls "a cross-functional process-based thinking". The purpose of accounting is to provide decision makers with reliable and relevant information. Its value is therefore maximized if it drives management to change unnecessary routines. Additional research opportunities exist in examining how incentive systems may be configured in order to achieve this goal.

CONCLUSION

The application of the ABC framework within the Teaching Hospital of Trieste, in order to obtain new and relevant information about the costs of selected treatments, has led to highlight the following issues:

1. ABC methodology is particularly useful for appreciating the different levels of complexity at which activities can be performed. Complexity, in fact, is one of the typical characteristics of healthcare services because of the tight interconnection among all the different activities involved in the therapeutic processes, and because of the high technological content of the resources employed. Moreover, processes in healthcare cannot be easily standardized, since the manners of their execution are imposed by the conditions of the patient. The three case studies emphasized the significant differentials in costs arising from contexts characterized by varying degrees of complexity. At the same time, the cases allowed to illustrate the cost measurement methodology employed, underlining how the analysis of a complex system can only be performed by adopting a set of complex parameters. In fact, any organization involved in the delivery of complex activities needs to adopt a complex (and therefore expensive) managerial accounting system. However, the benefits, in terms of relevance of the information generated by the system, almost invariably repay the costs.
2. Some organizations, such as hospitals, banks, and insurance companies, are already used to measurement because they are subject to various forms of control by external authorities, requiring them a constant flow of data. In these contexts, developing an advanced cost accounting system is a relatively simplified process, because:
    a. Available databases are often already adequate to the task, although integrations and adjustments may be needed,
    b. The gathering of new data needed to fill the informational gap is usually facilitated by a habit of attention to measurement.
3. Companies reap the full benefits of ABC systems if they use them as a basis for developing "what-if" analyses. Information generated by ABC systems does not need to be systematic, but it can be produced on an *ad hoc* basis when the organizational decision making process requires it. The relevance of ABC information is connected to its capability of drawing attention to cost determinants. Therefore, the ABC methodology is a valid support for decision-making, and an excellent cost analysis tool, but it does not necessarily represent the most efficient cost measurement system.

As a matter of fact, being based on the analysis of activities, ABC systems are prone to a high rate of obsolescence, and their maintenance costs tend to be steep, because activities evolve over time, especially in complex organizations. Traditional cost accounting systems, on the other hand, tend to be more stable and less expensive, because responsibility centers change less frequently than activities do. Unfortunately, the quality of information they provide is not up to the level of that assured by the implementation of ABC systems.

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KEY TERMS AND DEFINITIONS

Activity-Based Costing (ABC): A costing methodology that identifies activities performed within an organization and use them to assign the cost of resources to products or other cost object.

Activity Driver: A measure of frequency and intensity of cost object demands on an activity, used in ABC for tracing activity costs to cost objects.

Capacity: The ability to produce during a given time period, with an upper limit imposed by the level and quality of resources available.

Cost Pool: An accounting term that refers to a group of associated costs that all relate to a specific cost object. It is usually used to correlate costs with a specified cost driver.

Overhead: A group of costs that are necessary to the continued functioning of an organization but cannot be immediately associated with its output.

Resource Driver: A measure of quantity of resource consumed or required by an activity. It is used in order to trace an appropriate portion of cost to the activity.

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Chapter 13
Relational Dynamics and Health Economics:
Resurrecting Healing

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ABSTRACT

Primary care physicians' and allied healing professionals are overwhelmed with greater demands to provide complex care within business structures that either mandate high volume or exorbitant fees for service in order to support healthcare needs or sustain their livelihood. Statistics within the USA note that 40 to 50 percent of primary care physicians practice consists of complicated care. There are continued decreases within the USA of medical doctors who enter general practice and most choose to enter specialties where they are able to dictate their hours of availability and are reimbursed at a higher rate for services. The exception lies in psychiatry and pediatrics, where there is a shortage of providers and low fees for service. Models that have been proposed to alleviate issues related to these shortages include models of integrated health care, where physicians provide holistic care or partner seamlessly with others to provide total care at a single location. Physician extenders have been developed as an alternative where Master's Level Nurses and Physician Assistants are allowed to practice in the same setting and under the supervision of the licensed physician to deliver care. The intent of the physician extender is to allow the physician to spend greater time with more complicated cases and for the assistants to provide routine care. The issue becomes differentiating when a patient presents with a routine issue but actually requires complex interventions. When traditional physical medicine is combined with a need for psychological counseling the needs are complex, and medical doctors or physician extenders are provided with only a three month rotation in psychological diagnosis and interventions. Both socialized non-socialized medicine do not have a practice model in which they provide adequate care and holistic healing. This paper proposes a new model of providing holistic healthcare based upon relational dynamics in an economically sound manner.

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1. OVERVIEW

Ancient medicine saw healers, whether they were physicians, mid-wives, herbal healers, barbers, alchemists, shamans, clergy, or confidants as assuming a greater role than delivering individual short term care. Hippocrates and Galen (121-201 AD) provided guidance to early physicians in defining this larger role and responsibility in providing healthcare. Hippocrates envisioned the role of the physician as much more than simply a practitioner of medicine. He viewed the physician as having a moral obligation to provide care and healing and for this role to include: ethics, to do no harm, to teach, to care for the sick and injured, to provide confidentiality and to practice regardless of the patients' status, beliefs, allegiance, or ability to pay (Hippocrates, reprinted 2008). Galen introduced the expectation of healers to provide consistent education, individual and family psychological support and counseling, physical care that included home and community based interventions and in return to be supported financially within the means of the people they served. In his review of the history of Medicine, Porter (1997) noted that the healthier the community the wealthier the healers became as others sought their care by reputation.

The practice of medicine within the Balkans and Eastern Europe was also influenced by the Romans beginning before 100 AD but as Roman citizens after the first Dacia Roman War in 101 aqueducts and public health was addressed for citizens of the empire (Romanescu, 2011; Craughwell, 2008). Medieval medicine was heavily influenced by the bubonic plague, as most of Europe turned to religious explanations for the causal factors of this disaster; the Balkan region integrated other philosophical and scientific practices. (Lindemann, 2010; McVaugh, 1993; Siraisi, 1990) Ciric (2008) describes how Balkan medicine integrated knowledge from alchemy, folk medicine and midwifery into mainstream medicine and regulated practice.

In Eastern Europe and the Balkans the incorporation of Asian and Islamic Medicine into traditional Greek/Hellenistic practice created even greater emphasis on public health that later paired well with the principles of Communism and Socialism. In 610 AD, Muhammad included the ethics and teachings of Hippocrates and Galen with religion and teachings. In these teachings, or hadiths, he addressed issues such as amulets and prayer as well as mental and physical health, sanitation and the treatment of illness and disease. The Muslim physicians lead public welfare initiatives: asylums, ambulatory clinics, libraries and hospitals (the first in Baghdad in 805 AD). These Muslim doctors were seen as public servants, who were sent wherever there was a need within the region. (Werfelli, 2008)

In the United States, Puritan values and Capitalism created individualized healthcare for the wealthy. The role of public health advocate and enforcer was delegated to local government, who intervened only in extreme or potentially life threatening circumstances (such as STD's, epidemics, sanitation, etc.) or by forced control (e.g. the eugenics movement). As small towns wished to industrialize in the United States, they often attracted new residents by noting their access to employment, education, public services (electricity, water treatment, and sewers), housing, crime rates and healthcare. Towns recruited physicians and in rural medicine the community doctor was expected to provide more than just office hours to their patients- they were often consulted on public and personal issues and were required to travel for home visits. The USA developed private and public insurance systems to support the healthcare needs of its citizens. The private health insurance industry is available to those who are employed and can subsidize the costs of their healthcare in partnership with their employer's monetary contribution. The public healthcare insurer is financed by the federal and state governments and is available only to people who are living 200% below the Cost of Living (as determined by the Federal Government as the Level of Poverty), totally disabled, or who are minors. The USA's vision to provide adequate healthcare to all

its' citizens has not come to fruition. Private healthcare insurance that covers only devastating illness and basic prevention (such as immunizations previously covered by the state) does not provide adequate medical care: insurance premiums or deductibles (costs that must be paid in advance for insurance coverage to become effective) are outrageously expensive in proportion to income.

Socialized healthcare systems, such as what developed in much of Europe in the 1970's have become unable to afford to provide continued quality healthcare and many nations have developed hybrid systems (socialized basic care and subsidized insurance for those who are employed and state supported care for the disabled). Yet the systems being implemented in the USA are now attempting to follow these same deficient practices. The Washington Post and Kaiser Foundation (2012) conducted surveys from July 25-August 5 2012 and found the top economic concerns of those polled were in rank order: jobs, the cost of healthcare, the federal budget deficit, cost of education and housing. Regarding citizens views of healthcare this poll found 73% of those surveyed felt the cost of healthcare was an important or very important issue, 23% felt it was not as important or unimportant, and 4% did not respond. The actuary report conducted by Foster with the US Federal Government proposes that the out of cost deductible will be $6,645 for an individual and $13,290 for a family with qualified creditable coverage in 2014 and that a tiered private healthcare system will provide lower out of pocket expenses for individuals with higher benefit plans purchased or made available through their employers. This reports estimates that the out of pocket expense for plans under this tiered system will be 76% for individuals /64% for families under the basic coverage, 47% for individuals /40% for families under moderate deductible plans, and the lowest out of pocket expense will be for best coverage or platinum packages (2010).

People who have no ability to pay for healthcare or no access to healthcare do not receive preventive care (vaccinations and education) or less expensive early intervention. It is far less costly to educate a person to wash their hands and disinfect a small cut than to develop a bacterial infection. It is less costly to take or use an antibiotic for an infection than it is to administer IV medications. It is less costly to drain an abscess, than to surgically remove a limb. It is less costly to replace a limb than to treat someone with a massive systemic infection that requires intensive care and rehabilitation. To not provide preventive care endangers not only a region, or country but the economy of the world. By resurrecting some of these ancient principles of healthcare to create public health advocates and enforcers, as well as incentives to keep populations healthy, the healthcare of the world can be improved.

If a massive epidemic begins, or thousands of people die of starvation, organizations like WHO intervene on behalf of the world to thwart human and economic devastation. No one intervenes at the slow and steady decay of a healthcare system for a region or country, but this can have the same devastating effects on the population and the economy. The Bubonic Plague killed one quarter of the world's population and three quarters of Europe (Porter, 1997). The plague ended the period of enlightenment and began the dark ages. The factors attributing to the demise of the native Hawaiian population were small pox and syphilis introduced by explorers and traders. Over 75% of the native Hawaiian population died from these outbreaks of disease and they have never recovered their numbers, or economic status. (Ka'opua, Braun, Browne, Mokuau, & Park, 2011; Andrade & Bell, 2011) When nations ignore the health needs of their citizens and their resident or visiting foreigners they risk their existence and place the entire earth into jeopardy.

2. RELATIONAL DYNAMICS AND HEALTHCARE

Zazar and Waxman (2011) reviewed modern practitioner models within primary healthcare providers and suggested an integrated model for the delivery of care. They proposed the first 5 models are a progression of quality healthcare, but did not foresee the need for integration of the patient into their own provision of healthcare. See Table 1.

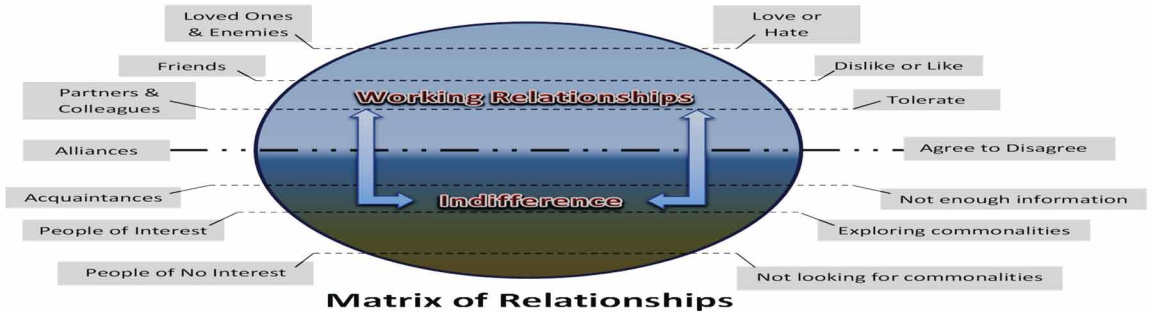
To be successful in providing healthcare it requires more than integrated care, it requires a relationship with the patient into the team of healthcare providers. A best practice team requires more participants than physicians and traditional allied health providers. The inclusion of community partners, paraprofessionals and multiple roles for team members is essential to provide lower cost quality care and maintain a more global focus on healthcare costs and quality. The proposed model for healthcare delivery returns to some of the ancient roles of healing and incorporate principles of character, ethics, technology, culture, beliefs, as well as medical/psychiatric knowledge and practice. If a medical student can practice as they are learning the skills to become a medical doctor, other disciplines can also provide similar services that are exclusively delivered by medical doctors under their guidance and/or supervision. Paraprofessional can be incorporated into service delivery in ways where their role is not to only provide transportation to and from professionals and sites of service, but to provide education, support, and guidance through an ongoing relationship. Medical specialists are necessary within all the various fields, but ongoing care should be provided within the context of an ongoing relationship. If a specialist provides care, their relationship with the "patient" should not end, as there is a likelihood that the person may need services again within that area, but also that the illness or disease for which they were treated is not an object that can be resolved in isolation, it is part of a living person.

Figure 1 provides a matrix of working and non-working relationships. In this diagram, working relationships require the ability to agree to disagree, without this premise there is less and less investment in the other or indifference. When students are being taught to be healthcare providers there are often encourage to objectify the patient rather than to work with the person in a relationship. They see a patient with a ruptured spleen who did not follow their orders; rather than a 22 year old woman who is working full time, raising children and attending college. She became ill with a virus that enlarged her spleen and it ruptured when she tried to return to work too soon because she would otherwise not be able to afford to pay her rent or buy food. To attempt to serve this woman or anyone alone as their healthcare provider becomes overwhelming. To alter one's perception to see a ruptured spleen, rather than a person is to lose sight of empathy and compassion and of being a healer.

Table 1. Modern health practitioner models (Adapted from Zarzar and Waxman (2011))

Model	Example of Practice
Independent Practitioner	Separate practices, little or no collaboration or interaction between providers
Coordinated	Separate practices, relationships with individuals → some exchange
Co-location	Shared space, but separate offices. Ease of access for patients
Collaborative	Shared space and shared responsibility for patients
Integrated	Professionals work as team independent from patient
Healers	Professionals work as team with patients as integral part of a team, focused on total healthcare and prevention

Figure 1. Matrix of interpersonal relationships: Bathory (2012)



When Hippocrates (reprinted 2008)looked to advise others on the choice of who should practice the Art of Medicine, he said the following:

Whoever is to acquire a competent knowledge of medicine, ought to be possessed of the following advantages: a natural disposition; instruction; a favorable position for the study; early tuition; love of labor, leisure…. He must also bring to the task a love of labor and perseverance, so that instruction taking root may bring forth proper and abundant fruits. Instruction in medicine is like the culture of the productions of the earth. For our natural disposition if, as it were, the soil; the tenets of our teacher are, as it were, the seed. p.3

Hippocrates identified the risks in healers having relationships. In the Hippocratic Oath, he warns against having intimate relationships, taking advantage of others, and denying treatment due to dissimilar beliefs. He saw the need for physicians to be able practice their art out of a passion for healing, not out of mere knowledge and skill. To practice medicine or psychology requires skills, to heal requires love, persistence, dedication and tolerance. In exploring the history of medicine and psychology, relational dynamics outlines the drives and strategies assumed to deliver an outcome.

Drives and relational dynamics are not static and interface at each decision point in a relationship. If one individual is driven by control, the dynamic most likely to be successful in engaging them is to work towards trust. If one of the participants in the relationship is driven by influence, the best strategy in engaging the other is in demonstrating competency. If influence is the major driver, then passionate argument leading to towards transparency is most affective. If altruism is the driver, then the guiding dynamics are those of equality, sharing, transparency, and bettering the world. As these drives and dynamics change the participants must adjust accordingly or they resort to the opposite dynamic (e.g. when trust is broken then rejection; when altruism is impaired then what is good for me (or an "us" that consists of a subgroup). Relationships require reciprocal participation, and when there is true indifference or rejection – there is no longer a dynamic. Table 2 explores psychological drives and their expression in Healthcare, Business, Education and Models of Governance. Table 3 provides the major concepts of relational dynamics and how they apply to healthcare. Section 2.1 shows a more detailed description of each concept.

Table 2. Drives and their expression in healthcare, business, education & governance (Adapted from Bathory (2012))

Drive	Healthcare	Business	Education	Governance	Statements
Force	Eugenics	Takeover-Eliminate	Mandatory-Repeat	Conquer	We control you and do what we want
Control	Institutionalization	Market Control	Compulsory-Regurgitate	Colonize	Do as I tell you and we will allow you freedom
	Independent Practice- I am the only practice	Market Dominance	Reward Systems	Annexation- Access to Goods & Services	You can see me or die
Influence	Independent Practice / Specialists- I am the best/expert	Monopoly	Lecture-Listen	Authoritarian Dictator/ Monarchy	I am better than the others, listen to me or go somewhere else
	Competitive Partnerships	Monopolistic Competition	Competition – Excel	Representation One Sided Respect	We can provide you better care and we might include you in the process
	Collaborative Partnering	Partnerships, Cartels, Oligopoly	Teams-Learn	Social Democracy Mutual Respect	We will all work together to provide your care
Altruistic Wisdom	Altruistic – Cooperative Care To provide healthcare for all with wisdom	Collective-Non-cooperative Altruism- To provide for all with wisdom	Collective Community Cooperation- Understand & Help Others via Altruism	Altruistic Governance- To help others and better the world	We will all work together to provide your care within the best interest of everyone

Table 3. Relational dynamics, their extremes and examples adapted from Bathory (2013)

Concept	Polar Extremes	Examples of Issues
Trust	Trust versus Rejection	Will you give me want we need to be healthy? Will you be here when I am sick or injured and need you or will you abandon me?
Will	Autonomy versus Isolation	Do I really need your help? I can keep myself healthy or cure myself.
Purpose	Identity versus Confusion	What are we trying to heal? Who does what to accomplish this?
Competence	Skills versus Omission	Do I (we) have the skills to do this, or am I (are we) missing something?
Proof	Evidence versus Commission	We have evidence of our competency, skills and performance. If we do not have these: Can we get by without you noticing? Can we hide what we cannot do or should have done?
Passion	Commitment versus Indifference	We will argue and fight with each other to get one another to understand and heal, or turn away and not care
Share	Transparency versus Deception	We want to work together and have an open understanding or we will lie to deceive one another
Altruistic Wisdom	"We versus Me"	We are more concerned about the good of all and the world than we are about our own individual health, power, fame and fortune.

2.1. Concepts

2.1.1. Trust

If a "patient" is unable to trust their healthcare provider the service provided becomes automated like a computer program following a decision tree predicting a diagnosis based upon data and performing or dispensing what is advised. A service is performed but there is no dynamic where one can affect the other. To trust and risk rejection requires investment and the possibility of being misunderstood harmed, or confused; it also fulfills the need to be connected and be valued as a human being.

2.1.2. Will

As a human begins to trust others they then begin to test and question themselves. To be independent of others allows people to be separate and unique individuals and to learn when to seek the assistance of others. The question become will they allow others to help them, how much and at what times.

2.1.3. Purpose

To join with another in the most basic way is to share a purpose. If we join together to identify a disease, illness or cure; we share a purpose. The "patient" or the healthcare provider may be motivated by any of the previously discussed drives, force, control, influence, sharing, or altruism and these may be expressed in status, monetary gain, knowledge, or equality.

2.1.4. Competence

Competency is reciprocal. The "patient" must be able to provide information in some fashion (reports of symptoms, drawings, etc.), physical evidence (such as fevers or broken bones), results of tests or analysis (e.g. blood work, MRI, X-rays, MMPI, Rorschach, etc.) and the healthcare provider must be competent in interpreting the data and results. If one is not competent they may need assistance from others. For example: A "patient" may need an advocate, or assistance from friends or family to provide vital information; while a healthcare provider may need a specialist to consult with or to refer to a text book.

2.1.5. Proof

When competency is present, the relationship moves more quickly toward an agreed upon intervention. If one or the other is not competent they must continue to strive toward gathering more information and sharing it in a way where both gain greater competency in moving toward health, or they rely on lies of commission. Lies of commission assume that there is some awareness of the lack of competency, but not a planned intent to deceive.

2.1.6. Passion

When passion is present both the "patient" and their healthcare provider can be at times diametrically opposed, yet they continue to attempt to get one another to understand their concerns. When joined together they are committed to overcome all obstacles that they may face in striving toward health. When passion is lost, they turn away with indifference.

2.1.7. Share

Sharing is an equality of respect not knowledge. Expertise of the healthcare providers' knowledge is acknowledged, but expertise of the "patient" in regards to what may be best for them must also be adhered to as the guiding principle. To share is to provide transparency of both practice and intent. When there is no willingness to share openly, there is intentional deceit. A cancer patient who expresses their desire for a functional and quality of life may opt to refuse a treatment. The healthcare providers should then support the decision of the patient with respect and continue to provide other needed healthcare.

2.1.8. Altruistic Wisdom

Here there is equality and respect and an openness to share and learn as well as a constant regard for the welfare of others. Global good over cedes the individual. Patients and healthcare providers here become teachers and healers of the world. Some examples are: deciding to donate a body part to save another's life, participating in a clinical trial of a medication or surgical procedure that may create better healthcare for others yet risks the life and reputation of those involved, or it can be as simple as consenting to an immunization so that others do not risk becoming infected.

Table 4 provides the hypothesized influence of dynamic variables on relational variables and illustrates the best strategy for successful interaction only when both parties are invested to win, or to mutually benefit.

Table 5 provides the decision equilibrium points and possible combinations of strategies that can be taken at each point for two participants based upon game theory. At each equilibrium point, one or more of the participants can change their strategy thereby resetting the equation and probabilities. Every

Table 4. Hypothesized influence of dynamic variables on relational variables (the greater # of + or -: the higher the anticipated correlation value) from Bathory (2012)

Probability	Force	Control	Influence	Altruism
Trust	+ + + +	++	- - - -	- - - -
Will	+ + +	++++	- - -	- - -
Purpose	+ +	+++	+	- -
Competence	+	+	+ + + +	-
Proof	-	-	+ + +	+
Passion	- -	- -	+ +	+ +
Share	- - -	- - -	-	+ + +
Altruistic Wisdom	- - - -	- - - -	- -	+ + + +

Table 5. Outlined strategies at each equilibrium point for two participants wishing for both to benefit (Bathory, Entreprenurial Characteristics and Relational Dynamics, 2012)

Decision	Equilibrium Point	Strategy
Venue	0	Healthcare
Pre-Game	1	Non-Cooperative/Non-Cooperative, Cooperative-Cooperative, Non-Cooperative/Cooperative
Game	1A	RESET OF 1 & continue or RESET OF 1
Pre-Drive	2	RESET OF 1 and choices of: Force/Force, Force/Control, Control/Force, Force/Influence, Influence/Force, Force/Altruistic Wisdom (AW), AW/Force, Control/Control, Control/Influence, Influence/Control, Control/AW, AW/Control, Influence/Influence, Influence/AW, AW/Influence, AW/AW
Pre-Relational Dynamic	3	RESET of 1, 2 &/or 3 and choice of: Trust/Trust, Trust/Will, Will/Trust, Trust/Purpose, Purpose/Trust, Trust/Proof, Proof/Trust, Trust/Passion, Passion/Trust, Trust/Share, Share/Trust, Trust/Con-joint, Con-joint/Trust, Will/Will, Will/Purpose, Purpose/Will, Will/Proof, Proof/Will, Will/Passion, Passion/Will, Will/Share, Share/Will, Will/Con-joint, Con-joint/Will, Purpose/Purpose, Purpose/Proof, Proof/Purpose, Purpose/Passion, Passion/Purpose, Purpose/Share, Share/Purpose, Purpose/Con-joint, Con-joint/Purpose, Proof/Proof, Proof/Passion, Passion/Proof, Proof/Share, Share/Proof, Proof/Con-joint, Con-joint/Proof, Passion/Passion, Passion/Share, Share/Passion, Passion/Con-joint, Conjoint/Passion, Share/Share, Share/Con-joint, Con-joint/Share, Con-joint/Con-joint
Pre-Outcome	4	Reset of 1, 2, 3 &/or 4 and choice of: Good for me/Good for me, Good for me/Good for you, Good for you/Good for me, Good for we/Good for me, Good for me/Good for we, Good for us/Good for us, Good for us/Good for we, Good for we/Good for us, Good for we/Good for we
Post Outcome	5	Reset of 1-2-3 &/or 4 ∞ or final outcome

equilibrium point resets the potential strategies that can be undertaken for the entire process or equation. The ability to reset the equation at multiple equilibrium points allows for reciprocal dynamics to occur among the variables. As more participants or equilibrium points are added, the complexity of the equations generated increase exponentially. In most applications, such as healthcare the equation will be reset numerous times through-out any process, requiring each party involved to reassess their best strategy and meet their desired strategic or final outcomes.

3. APPLICATION OF RELATIONAL DYNAMICS TO HEALTHCARE: SAVING PEOPLE SAVING MONEY

In a rural area of North Carolina in the USA served by a local management entity (Crossroads Behavioral Healthcare), there was a need for mental health care for residents who had a history of multiple high cost hospitalizations. These hospitalizations were often involuntary and long term. The patients were removed from their communities and their families. If they were employed, they lost their jobs and often lost their homes during their hospital stays. Once admitted, they were placed on medications they could not afford to purchase unless they became dependent upon the State. When released, if they attempted to become employed, they would lose their medical benefits and risk relapse. Families were stripped of their children and parents, marriages ended, employers lost people they needed to continue to operate their businesses. Property tax payments ended when the now "disabled" person was no longer required

to pay taxes. The cost of these hospitalizations was covered 60% by the federal government and 40% by a combination of state and local revenues. Rural communities impacted by such costs- both economically and psychologically were (and still are) devastated.

In response to this economic and human crisis a model for a rural assertive community treatment –where a team of professionals and paraprofessional provided hospital equivalent services in the community – was initiated. Assertive Community Treatment (ACT) began in the 1960's as an alternative to long tern hospitalizations for patients with "severe and persistent" mental illnesses such as schizophrenia and bipolar disorder. The original ACT programs were heavily staffed with professionals (MD's, RN's, and licensed allied mental health providers). These models were successful in urban areas where the population being treated was in close proximity. The adaptation of this model for rural healthcare was to add paraprofessionals to the teams, as well as to rely on supportive roles to be taken by community stakeholders. Stakeholders included public and private service entities (police, sheriffs, probation officers, child protective services, local magistrates and judges, school systems and teachers, public health officials, housing authorities, food banks, employment services, hospital emergency and urgent care providers, landlords, merchants and business owners, bank officers, public guardians, pharmacists, medical doctors, group home and shelter operators, etc.) to form alliances and partner to successfully keep program participants in the community. The "patient" was reframed from a victim to whom others needed to care for, to an expert in identifying their own unique needs and worked with others to form the means to address these needs. Professionals maintained their obligation to protect the general public's welfare and abide by state and federal laws as needed. All members of the team were voluntary participants who agreed to these basic premises of operation. Services were delivered when needed, where it was determined to be best for and in the amount desired by the person being treated. The majority, 85 to 90% of services were delivered in the person's community of residence; so team members were mobile. Psychiatrists visited people in their homes, schools, or places of work, as did other service providers. In addition to this community based out patient service, a local residential setting was created to provide more intensive short term care that was able to divert over 90% of the previous emergency admissions to the state hospital and return people to their communities within five to ten days. Previous state hospitalizations were often for a month or longer. The financial offset gained paid to develop additional ACT services and to assist in the financing of the local crisis residential treatment facility. With a small grant from the North Carolina State Division of Mental Health, Developmental Disabilities and Substance Abuse Services, the ACT model was modified to provide services for children who were at risk for out of home placements.

To provide these services required the physicians to become more like traditional rural healers. Physicians and their extenders provided care within the community, met with individuals and with families, advocated on behalf of their "patients" and provided support in schools, with employers, finding and maintaining housing, and inadvertently became stewards of the public's interest. These teams partnered with their "patients", their families, and their communities to coordinate resources and support. These new services in turn saved millions of dollars within the state and provided more humane treatment for the people with acute or severe mental illnesses. (Crossroads Behavioral Healthcare, 2005). The State of North Carolina was able to close a state hospital inpatient unit based upon the savings from this pilot project.

These same principles can be applied to providing holistic health care. To provide holistic healthcare requires the physician to provide physical and mental health care as well as to rely on other professionals and paraprofessionals to work as a team. The ACT model is an evidence based, best practice model,

within mental health but it is often delivered in a manner where it is altered to be convenient for the staff or becomes transportation services delivering patients to the doctor who is located in a centralized office. The ACT model becomes less effective as it is altered into anything less than true community service. To work in a seamless community team and practice holistic care will not suffice in addressing the sustainability of healthcare for the world. There is still a need for hospitals to deliver acute care.

3.1. Factors

There are twelve major factors that should be addressed when considering a model of sustainable healthcare. These factors are described in greater detail below.

3.1.1. Costs and Resources

Available health and community resources in the area need to be assessed to determine what are the current costs and existing resources. Who is involved in these services (as provider and patient) and what services are they are providing? Where there is there overlap in services? Is this overlap beneficial and or cost effective? Are there services that can be reduced (like prolonged hospital stays, residential nursing care) that can be shortened or modified to use the savings to provide additional services.

3.1.2. The Greatest Needs

Where are the physical locations of the greatest needs of care? Are these areas receiving adequate coverage? If there is duplication of services that has been identified previously, can the money saved be reallocated to other locations, where there are unmet needs. The prioritization of needs is a community endeavor. It requires not only mandates by the state to identify who is a priority population, but the community to see the needs and value the delivery of these services. The identification of needs should be across multiple entities: hospitals, public health and welfare organizations, schools, police, medical practitioners, religious groups, service organizations, advocacy group's local governments and consumers and their families.

3.1.3. Prevention

How can monies be allotted for the prevention of greater illness and disease? Where can illness, disease, or relapse be prevented? Providing care as early as possible rather than waiting for more acute or chronic conditions to develop saves money and increases the quality of life. Where are the people with preventive needs located? The design of the service model needs to adapt to where the population is located and what is being prevented.

3.1.4. The Most Cost

What are the most expensive services? Where are they being delivered? Are services adequate to better the quality of life, or resolve the illness of the people being served? Are these services providing the best outcome or are their alternative ways or means to provide services that would provide a similar level of care and cost less? Can a paraprofessional provide the same service with the ability to consult

with professionals, or is it actually most effective to have the professional perform "non-professional" services. For example, if a doctor is performing a home visit and there is no food in the house, is it more cost effective for the physician to call someone else to make a trip to the patient's home to buy groceries, or to go across the street and buy the groceries themselves? If the paraprofessional is at the home and a dressing needs to be changed, does a professional need to make a visit to change the dressing, or have the patient come to the office for something that can be completed appropriately by phone consultation with the paraprofessional. If the patient is able to go to the grocery store themselves and change their dressing, do they need either a paraprofessional or professional to provide a service? Can the patient call the doctor and perform what is medically necessary by consultation?

3.1.5. Cultural Beliefs and Practices and History

What are the existing dominant and subordinate customs and beliefs in the area? How can they be aggravating or mitigating factors in healthcare? What is the history of the area and the individuals being served? Healthcare practices and beliefs impact heavily on the decision making processes and the success of any initiative.

3.1.6. The Role of Government

What are the roles of the state and local government in the provision of healthcare and its monitoring? Is there a basic expectation for all residents to receive at least some care? Is there an investment by the government and public to improve the system of healthcare? Is there an expectation to save money and how much needs to be saved? Who are the public stakeholders who will participate in bettering healthcare? What do these stakeholders bring in resources, knowledge and expectations? Are the private stakeholders only interested in creating a profit for themselves or are they truly interested in creating a quality healthcare system?

3.1.7. Community's Knowledge

What knowledge exists in the community? How is this new delivery system of care explained? How is it challenged and questioned? If people do not know how to access the healthcare system, they will not engage in services early or appropriately. People tend to wait until they are more acutely ill. The cost of providing healthcare at a greater level of acuity is substantially higher than when it is preventive or an illness/disease is just beginning. Providers and the public need to be educated how to use the healthcare system, they also need to know why using the system at the appropriate level of care is important. A curriculum, developed for the school system may teach young people how to use the healthcare system. How are healthcare professional educated and re-educated to utilize they system efficiently? Will a national ad campaign on the access and use of the healthcare system be effective to reach the greater populous?

Within the USA, one of the greatest misuses of care occurs within emergency rooms. Often people who have public insurance, that covers 100% of the cost of the services, present with non-emergency aliments because they can be seen quickly by an MD. Other people who have no primary care physician and no health insurance come to emergency rooms for non-emergency care to avoid paying in advance

for their medical care, or wait until they will be served without question due to the life-threatening nature of their aliment. Creating private Urgent Care Centers has not greatly influenced these issues or costs because they provide non-emergency care for populations with private insurance.

3.1.8. Roles

How are the participants roles defined: by licensure, by experience, by competency, by passion? Who will provide guidance and structure to the roles of the participants? Who is allowed to provide what services and under what conditions? Who is paid as an employee and who provides service as a volunteer? What is defined as a service and what is defined as simply a humane courtesy?

3.1.9. Who Can Join With the Effort to Improve Healthcare in the Area?

Are their untapped resources, such as retired educators who could join in prevention efforts? Are their young people who are eager to learn knowledge and skills but are unable to work in traditional jobs due to their age? Can these young people provide some other type of support? Are there others in the community with knowledge, skills or desires to help? How are these unknown stakeholders (both individuals, public and private organizations) identified and engaged in the process and in the delivery of services?

3.1.10. Levels of Care

How is acuity addressed? How are needs triaged? When someone's needs change how does the system respond in a quick and efficient manner? What is the process for moving between levels of service or care? If someone refuses care, does it pose a public threat? There are times that force is necessary, in the delivery of healthcare, just as in any other human dynamic, but relying on force first, is ignorant. If providers are altruistic, they can match the "patient" at whatever dynamic they are functioning. If providers do not have the capacity to be altruistic themselves, they cannot meet the greater good of humanity. Hippocrates identified the need for healthcare providers to have altruistic motives over 2,000 years ago.

3.1.11. Reallocation of Funds

Where do the initial funds come to begin the system? When money is saved, then how is reallocated into the community most efficiently? How are places that are successful at reallocating funds and maximizing services encouraged to help other areas who are not as able to implement an efficient and effective system of care? Does one area have to supplement another because the funding is not as easily available? Constant reprioritizing is unrealistic, but re-examination needs to occur on a frequent enough bases that the system does not become stagnant and unresponsive to new needs.

3.1.12. Outcome Measures

How are the expectations of the system measured? If an outcome was to decrease hospitalizations and no one was admitted to a hospital, yet all the people in the area died- the outcome may not be desirable, but money may have been temporarily saved. Economically and psychologically, the area may be devastated and it may require more funding and services to restore a feasible economy and community in the

area than if the original hospitalizations were maintained. Are the outcomes realistic, reliable and valid measures? For example, discharging elderly patients from state hospitals who were institutionalized for the majority of their adult lives usually results in premature death.

These questions and areas outlined are not all inclusive as the process to restructure a system is undertaken the drives and relational dynamics of all the participants create a constantly evolving matrix of working and non-working interactions. There is no complete outline or step by step process that can predict human relational dynamics and the interaction between them. But understanding the drives and dynamics, aggravating and mitigating factors, and defining a structure to address and readdress issues creates a method to achieve desired results. As variables are better defined and their significance explored in multiple settings and applications, their ability to provide strategic insight into how to improve relationships and predict outcomes will also increase.

At the time of the rural mental health project described above, the theory of relational dynamics was not fully formed. The ability to determine the potential for working relationships and address underlying drives of the individuals involved relied on the intuition of the principle researcher. Instead of operating with no structured orientation when challenged with complex human interactions, this theory provides a template of reference and grounding. When faced with what seems to be impossible dynamics, understanding the drives and strategies of the other parties becomes paramount. Relational dynamics allows for a systematic re-examination of these major reciprocal or crucial points. Whether relational dynamics is ever formed into "an equation" or a series of equations and probabilities may not be as valuable as its ability to provide introspection into working successfully with others and in situations that are potentially disastrous.

4. SUMMARY

Hippocrates gave the world an invaluable gift, a premise for the selection, education, and character for healers. His oath remains over 2,000 years later as a commitment to the wisdom of these insights. When health practice and principles stray due to economic pressures such as the current worldwide recession/depression, lapses in humanitarian care can easily follow. As systems of education become more mesmerized with technology and profit and also have less emphasis on oaths and ethics, the practice of healthcare, like the structures of civilization decay. History is inundated with civilizations that flourish and perished by the same misguided concepts: to have more than others, to control more than others, and to take more than others. Math is excluded from ethics, yet a principle as simple as the whole is greater than the sum of its parts cannot be proven but can guide civilizations to survival. Natural resources of the earth may be limited only by the lack of innovation within current economic market controls. Medicines are discovered every day in plants no one knew existed but remote tribes who have used these substances for centuries. Our knowledge and our solutions are limited by who we allow to participate in the equation. If we are truly skilled and competent and aim to better the world, we should embrace all possibilities no matter where they originate or from whom they are generated. Including communities and "nonprofessionals", elderly, youth, and limitless others in the provision of healthcare as welcome participants with invaluable expertise as well as the "patient" is still seldom practiced in the world. Listening is a skill that can be learned at any age, empathy appears to be learned by the age of 3 to 5; the ability to listen and feel empathy for others is inherent in those who heal others.

Relational dynamics allows those interested in developing innovative healthcare systems to choose the best strategies to create cooperation in what is normally a non-cooperative interaction. When those involved (planners, providers, stakeholders, family and the patient) are all able to fall within the same dynamic and the same drive, they will by default have cooperation. The value of relational dynamics is to increase the probability of a successful outcome for all those involved. Ultimately in the field of healthcare, this outcome would be as Hippocrates alluded, to the benefit of all.

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Chapter 14
How Behavioral Economics Can Help When You Think You Don't Have Enough Money:
A Glimpse Into the Romanian Healthcare System

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ABSTRACT

This work is a position paper discussing alternative viewpoints on factors that may influence the values of certain crucial healthcare efficiency indicators. We draw attention to the latest research in the area of behavioral economics, and make obvious certain inefficiencies in base healthcare packages, which are in close connection with human behavior. We begin with an analysis of healthcare expenses, first in absolute terms and then compare them with the Euro zone as well as former communist countries from Eastern Europe. The purpose is to offer multiple perspectives in relation to the widespread idea that medical care in Romania does not have the financial backing enjoyed in other places. We continue with the presentation of several healthcare variables and the attempt to find possible alternative explanations for their values and dynamics. Finally, we sum up with an emphasis on certain human behaviors that might underlie inefficiencies in healthcare packages and examine the corresponding experimental results, which offer some simple solutions to correct them.

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INTRODUCTION

The year 1981 brought to the forefront of scientific research one of the most important results in behavioral economics (Tversky & Kahneman, 1981), specifically that our decisions are influenced by many different subjective elements. The way in which information is *framed* plays a crucial role in the decision making process. The famous example of the Asian disease, discussed in the aforementioned paper, presents the choice between two alternatives, formulated in slightly different ways, as seen below.

We are presented with the (obviously hypothetical) situation in which the US is preparing to deal with an Asian disease that will, most likely, kill 600 people. There are two alternatives that may be chosen, programs A and B. The two options are as follows:

Option 1:

- If Program A is adopted, 200 people will be saved.
- If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved.

Option 2:

- If Program A is adopted 400 people will die.
- If Program B is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die.

It is easy to notice that, objectively, the two options are equivalent: to say that 200 people would be saved by Program A is the same as saying that 400 would die as a result of the same decision. Furthermore, a 1/3 chance that all 600 would survive is the same as saying that there is a 1/3 probability that nobody would die. Finally, a 2/3 chance that nobody would be saved, as per option 1, is identical to the 2/3 likelihood that all 600 would die. Therefore, the only difference between the two options is, what the authors call, the framing of the decision: positive (in terms of "survival") in the first case and negative (in terms of "number of dead") in the second one. The results obtained by Amos Tversky and Daniel Kahneman indicate that people choose differently when the information is presented to them with another framing: option 1 shows that 72% prefer Program A, as opposed to only 28% for Program B, manifesting what is known in the literature as certainty bias when it comes to gaining something: the positive framing in option 1 triggered a preference for saving 200 people. The second options shows that only 22% would choose Program A, the majority of 78% would rather negotiate the loss of 600, instead of coming to terms with 400 people dying.

In the summary of the paper, the two authors tell us how "the psychological principles that govern the perception of decision problems and the evaluation of probabilities and outcomes produce predictable shifts of preference when the same problem is framed in different ways" (Tversky & Kahneman, 1981). In other words, this is the birth statement of the powerful framing effect, with such a simple mechanics and such a great impact on decision-making and different types of behaviors, economic and non-economic ones. Changing preferences for certain alternatives goes beyond the hypothetical and is responsible for different choices which are made in real life, a fact which is explored in further detail in the fifth section.

A second stream of arguments standing for analyzing health care in light of behavioral economics can be generously traced to the more methodological camp of causal relationships and subjective, hidden relationships. The Freakonomics example of Steven D. Levitt and Stephen J. Dubner (Levitt & Dubner,

2005) is still among the most convincing one. The beginning of the 1990s was, in the United States of America, an era in which the state was fighting a losing battle with a decades long growing crime rate. The period before 1995 was characterized by inefficient efforts on the part of the state in order to lower crime rates by: increasing the number of police, improving street lights, gun control and other similar policies. At the time, there were experts predicting that the crime rate would be expected to rise by 15% in the coming decade.

However, starting with 1995, suddenly and without explanation, the crime rate started to go down, reaching, in the years after 2000, the lowest percentage in 35 years and prompting experts in different fields to offer justifications for this change. The explanations ranged from the increased performance of the US's economy to the idea that all the policies implemented in the past started to have effect. The factor which contributed massively to this change came from an unexpected source: the year 1973 marked the legalization of abortions in the US and so, many of the children, who would have been born in an environment which favored criminal behavior, were never born. But, as the two authors point out, none of the criminal experts mentioned legalized abortion as a possible cause for a lower crime rate in the US.

The examples above focus on two aspects which are essential to the positioning of this paper:

1. The framing of information matters.
2. Not all the variables which one would take into consideration actually explain or are the most relevant to the studied phenomenon.

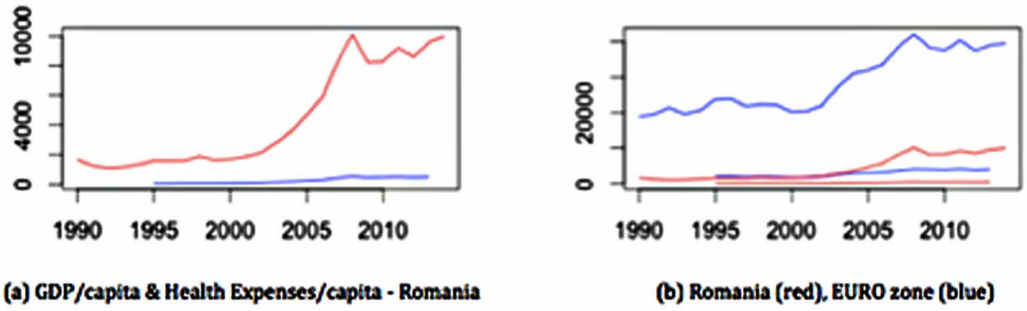
Starting from these observations and from the fact that, most of the time, the public discourse in relation to the Romanian healthcare system is one which focuses on the lack of funding as well as the conviction that an underfinanced system cannot be efficient, our objective is to investigate other possible framings for the same objective situations and possible unexpected factors which might contribute to improving efficiency of the healthcare system, without increasing current expenses. This attempt is based on prior experimental results obtained in healthcare behavioral economics and, while we are not at a stage where we can guarantee that each alternative perspective is actually relevant, the overall argument cannot be denied.

The paper is structured as follows: we will begin with an analysis of healthcare expenses, first in absolute terms and then compare them with the Euro zone as well as former communist countries from Eastern Europe. The purpose is to offer multiple points of view in relation to the widespread idea that medical care in Romania does not have the financial backing enjoyed in other places. This is be followed by a presentation of several healthcare efficiency indicators, as recognized by the literature and the attempt to find possible alternative explanations for their values. In the third part we will present certain human behaviors which might underlie inefficiencies in healthcare packages and examine a few experiments which offer some simple solutions to correct them.

Speaking of Money: Simple Analyses and Unorthodox Explanations

The almost universal opinion, as found in public statistics and reports as well as the opinions of average people, is that there isn't enough money for the Romanian healthcare system. Without having a very clear understanding on what "enough" is supposed to mean, we started out from the idea that it suggests a comparison with something (be that the European average, or what happens in Germany, a very common assessment found not just in the financial assessments of the system) or a result which ought to be

Figure 1. Comparison between healthcare expenses per capita and GDP per capita Romania and Euro zone
Source: Worldbank. Graphs created by the authors using R.

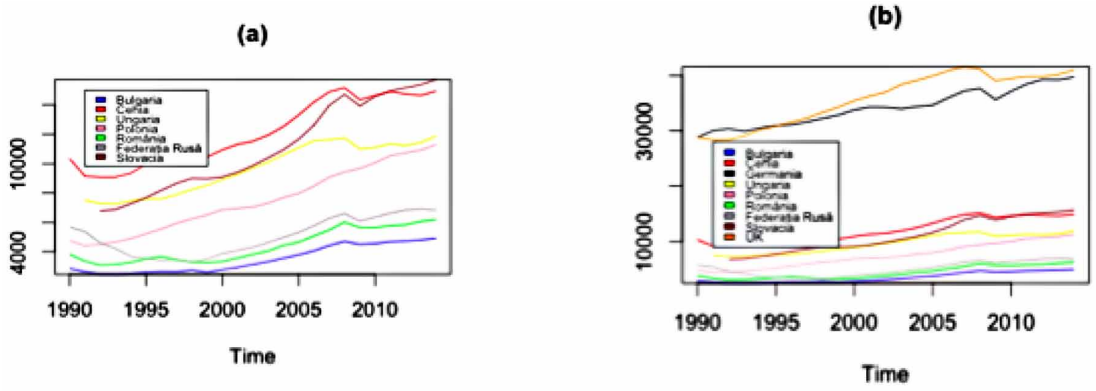


**For a more accurate representation of this figure, please see the electronic version.*

achieved (such as a certain performance). Following the same steps as those of the majority opinion, we analyzed some data as follows. We started by comparing healthcare expenses per capita with the evolution of the GDP per capita and found, as can be seen from Figure 1, that Romania is not much different from the Euro zone. The difference between GDP per capita and healthcare expenses is greater in the Euro zone, which would suggest that, despite the common criticism, Romania tried to achieve better results with limited funding even before 2000, when the graph shows a significant increase in GDP.

The major consideration which needs to be taken into account when analyzing Romania and the Euro zone, for example, is the discrepancy in the purchasing power parity enjoyed by the institutions in each country. If they are all represented under the same exact conditions, it is easy to notice that Romania barely shows up on the chart when compared to other Euro countries. This is a fact that must be taken into consideration every time when stating that expenses in Romania are "way below those in more advanced countries". This fact goes hand in hand with another one which is just as important, and can be found in Figure 2.

Figure 2. The evolution of GDP per capita: Romania and the rest of the eastern European former communist bloc countries and compared with Germany and the UK
Source: Worldbank. Graphs created by the authors using R.



Bulgaria – blue, Czech Republic – red, Hungary – yellow
Poland – pink, Romania – green, Russia – grey
Slovakia – dark red, Germany –black, UK - orange

**For a more accurate representation of this figure, please see the electronic version.*

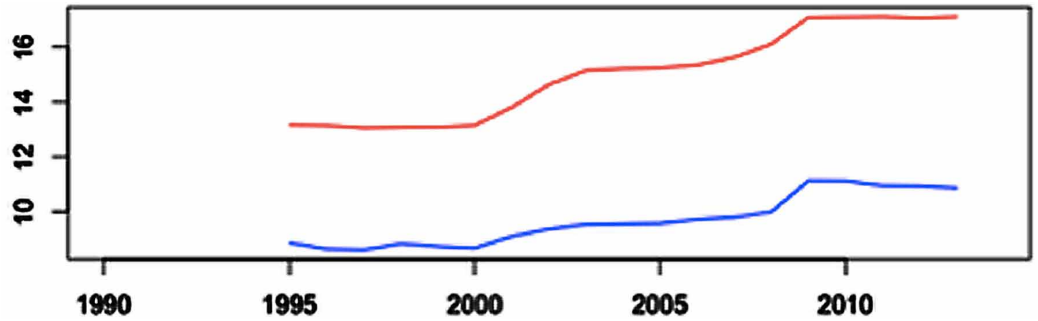
Without going into too much detail, a simple analysis of the graph (a) above shows that in 1990 Romania (represented in green) was only above Bulgaria in terms of GDP per capita, when compared to the rest of the Eastern European former communist bloc countries. Furthermore, at the time, Romania was one of the poorest countries in Europe, only above Albania and Bulgaria. Sadly, the situation has not changed since then. Each one of these economies has improved since then; however, their order has not changed. This is an objective aspect which must be considered so as to point out that while significant efforts have been made, the historic, economic, cultural and social truth cannot be ignored.

Figure 2b makes the injustice of comparing with developed countries even more obvious. We can notice that, when comparing the *entire* eastern bloc with benchmarks of the free economy, such as the UK or Germany, the lag remains the same, not just for Romania but for all of these countries, in relation to the benchmarks. These are fundamental truths which cannot be avoided when attempting to compare our national performance with other reference points which, historically, are not like us.

Another idea which is commonly found in the literature is that "out of the entire European Union we allocate to healthcare expenses the smallest percentage of the GDP" and the numbers cannot be contradicted. Figure 3 presents the percentage of the GDP allocated to healthcare in the US and Canada. It can be noticed that the US's northern neighbors allocate only 2/3 of the American expenses, however, the opinion across the board is that "the healthcare industry in the US is strange, we allocate 18% of the GDP for healthcare and yet, other countries seem to obtain better results – and we don't know why" (Hough, 2013).

The discrepancy between expenses in the US and the lack of adequate results has been the focus of study for a multitude of papers. Without investigating all the explanations which have already been brought forward by others, we will point out that, in line with our paper, the thesis that more money will guarantee better results cannot be generalized. And yet, the fact that an underfinanced system cannot be efficient is unanimously accepted. Foregoing the annoying fact that we have yet to establish what *adequate* financing actually means, we will focus on efficiency in healthcare. In order to measure efficiency, while staying in line with the purpose of the paper, we will focus on two, generally accepted, indicators: average life expectancy and probability of death between the ages of 30 and 70. We will study these two from an ordinary statistical perspective as well as some less than usual points of view.

Figure 3. Healthcare expenses in the USA (red) and Canada (blue) between 1995 and 2014
Source: Worldbank. Graph created by the authors using R.



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Money or... Something Else?

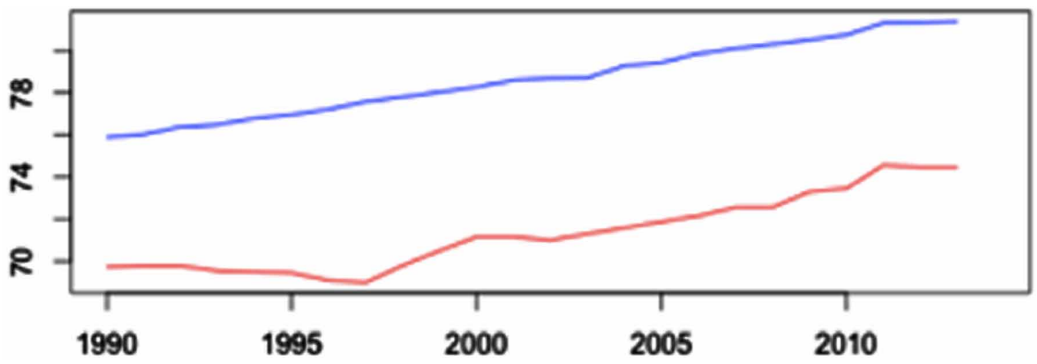
Figure 4 shows the evolution of the average life expectancy in Romania (red) and the European Union (blue) between 1990 and 2013. The 6 year difference between the two lines is obvious, a fact which can be recorded as (yet) another failure on the part of the Romanian healthcare system when it comes to taking care of its citizens, this being the result of inadequate funding.

This paper does not deny the basic premise that more funding can lead to better healthcare conditions and, as a consequence, improvements in the average life expectancy. However, it posits that other less obvious factors exist and that they can be just as important. Such an example is a study conducted by Yale University (Levy et al., 2002) which focused on the attitude towards aging. The sample was formed of middle aged participants who were observed for a period of 20 years. The final data showed that those people who had a positive outlook towards aging had, on average, a life expectancy greater by 7.6 years than the rest. The authors found this result to be very surprising because other factors which are better known to contribute to improved average life expectancy – such as not smoking, regular exercise, an appropriate level of cholesterol and blood pressure – contribute only by 4 years on average.

The idea that "just" having a positive attitude will have an impact twice as large on the average life expectancy as living a life as recommended and monitored by the official healthcare system in Romania is not only interesting, but also quite appealing for those people who wish to let go of the pressure that they cannot control what happens around them. Speculating on this result, one can say that this is of little use when the general attitude is that "you cannot have a positive attitude when the system does not help you make one".

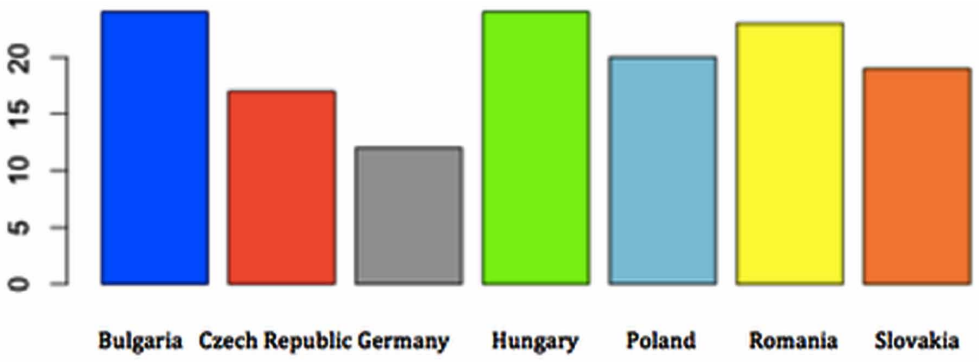
The likelihood of death between the ages of 30 and 70 is another efficiency indicator which we will analyze in this paper as being relevant to our purposes. Figure 5 shows that, in Romania, the risk that a person will die between 30 and 70 is 21%. Evidently, there is a very close correlation between healthcare expenses and the value of this indicator and the difference, when compared to Germany (a country with which we seem to insist on comparing ourselves and which chosen for unclear reasons), is clear and very obvious. However, an interesting and immediate observation is that the situation in Romania is similar to that in Bulgaria and Hungary, three countries in the same geographical area. As such, while financing plays a significant role, we cannot ignore other aspects which ought to be investigated.

Figure 4. Average life expectancy in Romania (red) and the Euro zone (blue) between 1990 and 2014
Source: World Health Organization. Graph created by the authors using R.



**For a more accurate representation of this figure, please see the electronic version.*

Figure 5. The likelihood of death between the ages of 30 and 70, in the year 2012, for 6 former communist countries in Eastern Europe
Source: World Health Organization. Graph created by the authors using R. The most recent available data was for 2012.



A study worth taking into consideration in this context was conducted by Duke University (McGonigal, 2015, p.xiv) and it involved a sample of adults over the age of 55, which were monitored for a period of 15 years. At the end of this period what was found was that 60% of the people who believe other people to be trustworthy were alive, as opposed to those who did not consider other people to be trustworthy of which 60% were not alive. This result, which can be summed up simply by saying that "those people who trust other people tend to live longer" is relevant because it draws attention to one of the most important features of Romanians, specifically the lower level of trust which they have not just in institutions but also other people (Mitruț et.al, 2013). This is a possible side-effect of the more than 42 years spent under communism (Vâlsan et.al, 2015), or maybe an inherently Romanian trait (Zamfirescu, 2008), whatever the exact reason behind it, it might point us towards less obvious (but just as important) causes for the high likelihood of death between 30 and 70 and the low average life expectancy.

In this last part of this section we would like to draw attention to a well-known aspect, recognized by national and international forums, that an increase in the average lifespan will be associated inevitably with an increase in the number of people who suffer from chronic disease, in the number of deaths by chronic disease and the percentage of medical services dedicated to different age groups. As such, an increase in average life expectancy needs to be accompanied by improved *quality* of life, so that the risk of disease and death in a certain age intervals will be lowered. On the other hand, there is evidence that, beyond outside interventions, we too can also help ourselves.

A 1998 study, conducted in the USA, researched the effect of stress on the risk of dying (McGonigal, 2015). Initially, 30.000 people were asked

1. How much stress were they subjected to in the last year,
2. Whether they believe that stress is dangerous.

Eight years later, the results showed that high levels of stress were associated with a 43% increase in the risk of death. The surprising part was that this result was true only for those who answered that stress is dangerous. The researchers came to the sad conclusion that, over the course of those 8 years, while the results were not known, 180.000 Americans had died because they were convinced that stress is affecting them. What is going on, as per the quoted author, is that a single factor need not impact

the health of a person, or their life expectancy, but a combination of that factor and the belief that it is harmful may influence it.

The purpose of this section was to show the reader that beyond those objective factors which we consider relevant when trying to explain certain dynamics or values for some indicators, and most of the time this is rightfully so, there also are some subjective elements which influence the expected results – and their impact can be much greater than expected. Detecting them and quantifying their impact can be done through the use of experiments which are not easy to implement, are expensive, or there are ethical limitations which need to be considered. On the other hand, we believe that continuing such investigations will lead to unexpected benefits in any healthcare system, not just the Romanian one, by helping the patient, or potential patient, reach a mental state which can be of a very real use in preventive care and recovery.

The Good and the Bad of Basic Packages

On the 1st of June 2014, a new basic healthcare package was introduced in Romania, along with the relevant legal framework. The information sources at the time (http://www.hotnews.ro/stiri-esential-17398547-pachetul-servicii-medicale-baza-contractul-cadru-intra-vigoare-1-iunie.htm) explained the differences between the previous design and the reason for which they were implemented. We can glean from these descriptions the desire to improve the efficiency from a functional perspective (by eliminating some of the bureaucracy), but also on the provided services: more types of services and improved access. An important aspect of this new package involved a different type of improvement in efficiency, related to reduced costs (in as much as that is possible) and a redistribution of resources in support of other initiatives; to be more precise, a more careful decision making process when it comes to admitting someone in the hospital for care, with the high costs for hospital treatment being well known, and a focus on preventive care which, in the medium and long term, ought to lead to a natural reduction in expenses at the level of the entire healthcare system.

In 2013 the first basic healthcare package was implemented in Romania. It was the result of more than six years of high-level talks among Romanian authorities (http://www.hotnews.ro/stiri-esential-15707508-cum-schimbat-ersul-doctor-pachetul-baza-romanii-vor-invata-numere-consultatiile.htm), and it lasted for only one year before it was modified. Far from being a sign of inadequacy in relation to the assumed objectives, the desire to change the package after one year is, in our opinion, a result-orientation focus which is in line with the experience of other countries: there is no such thing as an optimum package to be applied (see Wong&Bitran, 1999).

The limited experience of Romania in this area of expertise is a reality which we cannot and should not deny and it is expected that the structure and implementation of the basic healthcare package will be adjusted as more knowledge is gained. However, from the available information, the trend seems to be that of optimizing what is already offered, in the detriment of other components for which there is no available data.

The literature available from countries with more experience in this area is awash with explanations and examples related to the discrepancies between what is offered and what is actually received or used when it comes to a basic healthcare package. The parties involved in the development of such a package – the government, the service providers, the people who is actually in need of healthcare services and sometimes, when the payment is not done by the state, the financier – have very different interests and priorities and, most of the time, the result of their deliberations is an adequate response only for the

needs of some and less so for others, so that the (sometimes perceived) needs of the population are not always in alignment with the services covered by the basic package. Once more, the argument brought up, for why the population does not receive what it wants, is inadequate funding, with money being the most obvious signal for the quality of the expected result. The following section will show that there still are significant factors which have yet to be adequately considered, such as the fact that we have too little information concerning people who, for subjective reasons, are not following their treatment, even if it is covered.

In order to understand what exactly we are referring to when we mention unavailable information, let us take a look at Figure 6 which shows the number of deaths caused by heart disease in Romania and in other former communist countries.

We can notice that Romania is in second to last place, just above Bulgaria, which would lead us to believe that the care provided to those who suffer from heart disease needs to be improved. Without contesting this idea, but staying in line with the same reasoning as up until now, we must admit that there is no statistical data on whether these people were registered as suffering from heart disease, whether they were under some kind of treatment for it, or whether the information was obtained simply by taking into account the information from the death certificate. Without access to more data – named "silent data" by statisticians – it is very hard, if not impossible, to establish a direct link between an indicator and the efficiency, or inefficiency, of the healthcare system.

Another aspect which needs to be taken into consideration when discussing the accuracy of the information underlying the decision, irrespective of the area of interest, can be illustrated by the press releases, issued by the National Institute of Statistics, concerning the percentage of the population which, for financial reasons, did not have access to medical services. The annual data for the period 2007-2013, divided by sex and age group, can be found in Figures 7 and 8.

From Figure 7 we can see that the percentages are rather large, greater than 70% when talking about the population as a whole, which might lead us to believing that, in Romania, the financial aspect is the main reason for which people do not go to the doctor. On the other hand however, we cannot help but notice that the group which offers money as the main reason for not going to the doctor is the one composed of men, about whom doctors already know that they only come in for a consultation when the disease has reached an advanced phase due to the fact that they are more fearful than women. Are the percentages true or would it be possible that these answers are only *substitutes* for the real reasons?

Figure 6. Number of deaths caused by heart disease, in 2012, for 6 former communist countries in Eastern Europe
Source: World Health Organization. Graph created by the authors using R. The most recent available data was for 2012.

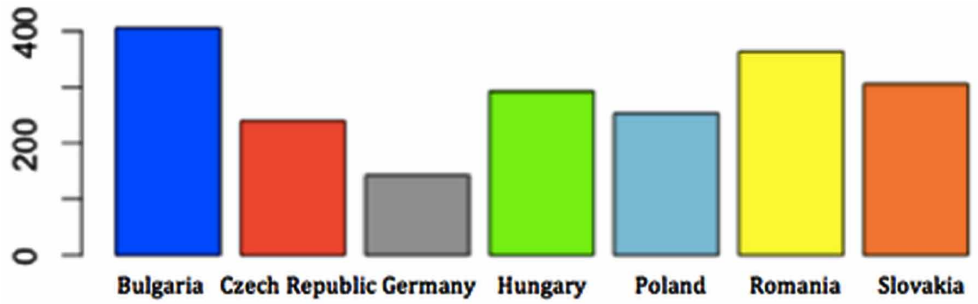
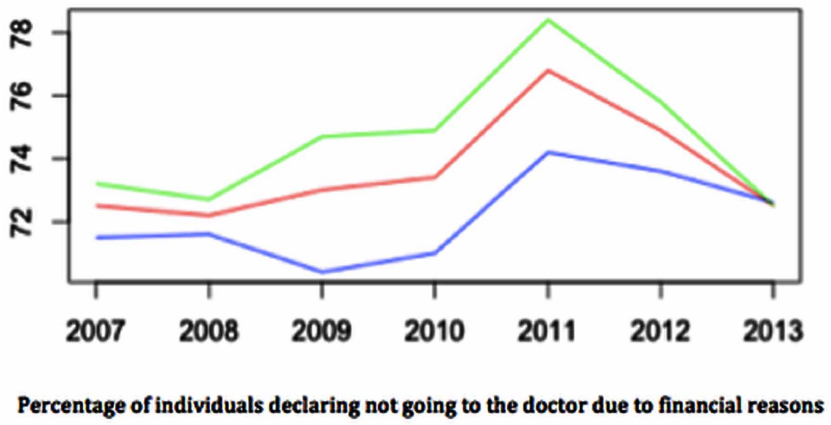


Figure 7. The percentage of the population, by sex, which did not seek medical attention for financial reasons. The data is for 2007-2013
Source: National Institute of Statistics. Graph created by the authors using R.



**For a more accurate representation of this figure, please see the electronic version.*

This will be discussed further in the next section. What is surprising is that the age group does not seem to have an important impact (and we are referring here to large differences and not just *statistically significant*) on the percentage of those who do not go to the doctor for financial reasons.

Judging from an economic perspective, Figure 8 is hard to interpret for a European country. Intuition would tell us that a working age person has a lower probability of reporting financial difficulties when they require medical attention, in comparison to a retired person for whom income is drastically reduced.

Figure 9 might signal the fact that the year 2013, when the basic healthcare package was introduced, was one in which people's access to medical services was limited due to financial constraints and the initiative came just in time. According to data from the National Institute of Statistics, the 50 to 64 years age group is the one most affected by financial constraints, with a percentage of 75,6%, greater even than the 75 and above group, which reported "only" 73.7%.

At the same time, taking a more moderate perspective on these results forces us to point out that, while we can find explanations based on objective factors for each one of these graphs (the effects of the crisis

Figure 8. The percentage of the population, by age group, which did not seek medical attention for financial reasons. The data is for 2007-2013
Source: National Institute of Statistics. Graph created by the authors using R.

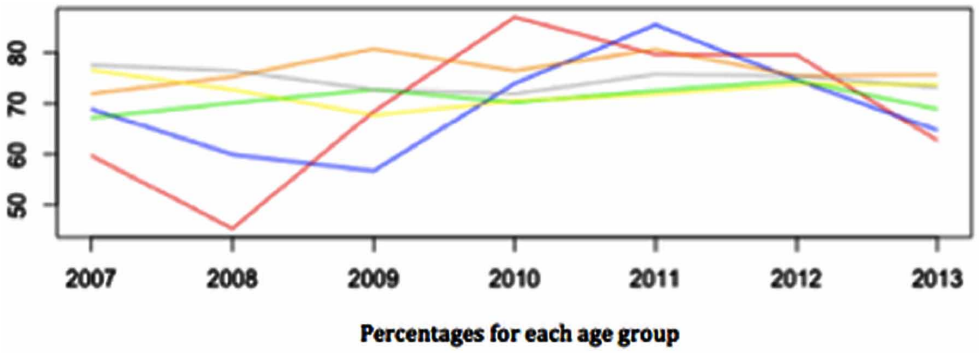


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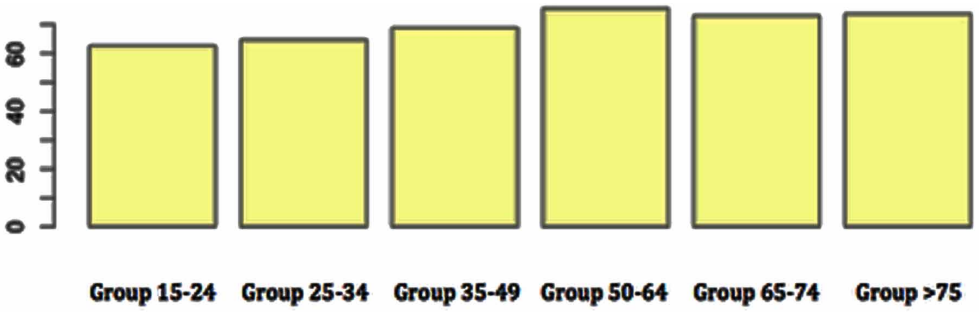
Figure 9. The percentage of the population, by age group, which did not seek medical attention for financial reasons. The data is for 2013
Source: National Institute of Statistics. Graph created by the authors using R.



on income levels, unemployment for the 25-34 years old age group, the difficulty in finding employment between the ages of 50 and 64 etc.) we cannot help but compare them with the same data from Eurostat and notice that, for the same indicators, they provide much lower values. Furthermore, we cannot help but notice that the distribution of the data in Figure 9 is almost uniform, which contradicts the assumed income distribution for different age groups as well as demand for healthcare services in accordance with age. It is true that the National Health Institute explicitly states that this is based on self-reported data, meaning that it contains the reasons considered most important for not going to the doctor from the perspective of the respondent and are influenced by societal expectations, but the information itself casts doubt on the validity of using this type of statistical data when basing a decision.

Most likely the differences between the two are the result of how the information was obtained. The National Institute of Statistics reported, most likely, the percentages when compared to the total number of people who required healthcare services but were not able to obtain them, whereas Eurostat got the percentage by comparing those who did not seek medical attention due to financial constraints out of the total interviewed population, which also included 80% of the respondents who did not need to seek medical attention. Despite the fact that there are explanations for the numerical differences themselves, in the absence of more careful studies, it is not possible to know whether or not we can rely on these percentages when trying to decide what are the real reasons for which people did not seek a consultation or medical care.

If the subjective reasons for which Romanians do not go to the doctor are hard to identify and will remain, most likely, an area for future study, other countries – with more available resources, such as the United States, for example – are confronted with a slightly different problem: the moral hazard of those who are in the care of a doctor, are offered services and medication, and yet they do not abide with the treatment program. We do not know whether this is the case for Romania as well because here too there aren't any available data. However, because basic healthcare packages are still in their infant stages, we believe that it may be useful to learn from the experience of other countries in terms of patient behavior and to what degree does it align with the purpose of the healthcare package.

On the Behavioral Economics of Health

Many of the choices we are confronted with, either in general of related to health, have an inter-temporal dimension: the costs and associated benefits are placed at different moment in time. For example, when making the decision to exercise daily we are taking into consideration some immediate costs (such as the time it takes, the gym membership costs or the physical effort) and a series of benefits which we hope will manifest in the future (better physical condition, improved heart rate etc.) Similarly, we are confronted with decision in which the benefits are immediate, such as enjoying a dessert and the cost are deferred to the future.

A "perfectly rational" analysis, that is one in which everyone does as they are supposed to, ought to compare, in a similar fashion, the costs and benefits, without allowing for significant differences in the evaluation process. Nevertheless, a more realistic approach, beyond this idea, points out the fact that accepting immediate costs is, in itself, a more difficult process than accepting immediate benefits, given the large number of temptations around us and our imperfect self-control (Thaler & Shefrin, 1981). Therefore, it is no surprise that a large number of behaviors, economic and non-economic, stray from the recommendations of the cost-benefit analysis.

Patient behavior, specifically the lack of total adherence to different treatment plans, usually follows this trajectory. A research team at the University of Pennsylvania, Center for Health Incentives and Behavioral Economics, lead by Kevin Volpp (2008), investigated this troublesome situation on a group of patients who were in recovery following a heart attack. The reference benchmark is given by statistics which show a very low level of adherence to the prescribed medication, usually warfarin, in the year following the heart attack, That is, despite the significant benefits of the treatment, 40% of subjects do not take 20% or more of the recommended medication (Kimmel et al., 2007).

The study involved the use of a "smart" vial, built with the ability to monitor and transmit wireless information about the medications taken. In the first stage, the assumption behind the experimental design was to introduce supplementary benefits for taking the medication in question by creating the opportunity to win cash prizes for conscientious patients (those who took their pills) by using a lottery: there is a 10% chance of winning $20 and a 1% chance of winning $100. This formed the treatment group. For the other group, known as the control group, there were no additional incentives for taking drugs, apart from the intrinsic benefit, which is to protect from the high risk of death. The level of adhesion increased, but not to the expected level or that predicted by standard economic though, which says that financial incentives are one of the most powerful influences when it comes to changing behavior.

These results led to a second experiment, structured in an almost identical way to the first. The only difference was the fact that all the patients, regardless of their behavior towards their treatment were included in the lottery, so theoretically had the opportunity to win a cash prize. The difference appeared after the lottery winner was determined. The way it worked is that they announced the winner if the patient had adhered to the treatment or the patient was told what they *could have won if they have taken their medication*. The structural difference in the experiment illustrates the concept of loss aversion (Kahneman & Tversky, 1984) and is a significant factor when determining human behavior, in this case generating a level of adhesion of almost 100%.

One of the most popular ways for making use of loss aversion is by integrating it in the framing effect of a decision problem. The study conducted by McNeil et al (1982) shows this effect by analyzing the preferences of individuals for two medical treatments. Specifically, subjects were given statistical data

concerning the results of tow treatments for lung cancer: surgery or radiation therapy. Survival rates for five years favor surgery, but in the short term it is a riskier option than radiation treatment.

Half of the participants read statistics on the survival rates and the other half were given information concerning mortality rates. Following that, they had to choose the treatment that they preferred:

Scenario 1: The survival rate after surgery is 90% in the first month.
Scenario 2: The mortality rate after surgery is 10% in the first month.

Although it is easy to see that the two propositions are equivalent from a logical perspective, the results of the experiment showed that the surgery was a much more popular option in the first framing, being chosen by 84% of the subjects. In the second framing only 50% chose surgery, thus pointing to a loss aversion behavior. The framing effect (the way in which the information is presented) is emotional: survival is good (90% is an encouraging percentage), but mortality is frightening (even at a 10% level).

Another important characteristic of this study is that it was conducted on different types of subject. What is remarkable is the fact that the group formed entirely of doctors was found to be just as sensitive towards the framing effect as the non-medical groups, one being formed from the patients in a hospital and another one from graduates of economic studies. Therefore, medical studies need to be supplemented by knowledge concerning the way in which people perceive, understand and process the different types of information available, especially statistical information.

This same type of significant results, which are not influenced by the analyzed population, are found when discussing the placebo effect. Although when compared to the other phenomena analyzed in this sections – loss aversion and framing effects – it has been know for much longer, its implementation in an experimental design, which constitutes the replica of a well-known situation, continues to yield surprising results.

In a study conducted at Duke University, Dan Ariely (2008) showed that a painkiller which cost 10 cents did not combat pain as well as one which cost $2.5, given that both of them were in fact the same placebo. The experiment was done on 82 subjects; each one being administered a standard protocol of electric shocks to their wrist, in order to get a subjective evaluation of the pain they felt. The test was conducted both before and after the placebo was administered. The difference between them was that half of the participants received a leaflet which described the pill as a newly approved painkiller which cost $2.5, whereas the other half received a leaflet saying that the pill cost 10 cents, without any further explanations. The results showed that 85% of the members of the first group (price of $2.5) reported a reduction in pain and only 61% of the second group (price of 10 cents) reported a reduction.

Therefore, even if money is the justification brought up for different behaviors, this type of empirical evidence ought to draw more attention to the fact that this belief is only in our mind and that, in reality, the true reason is something completely different.

Being aware of the general tendency towards maintaining the status-quo, especially when it comes to ideas so deeply entrenched in the collective mind, we do not expect for the general perspective to change in a very short period of time. This is also due to the fact that there are situations in which the available statistics show that money matters, but this is significantly easier to remember than the follow-up interpretation for them: it matters, but not as much as one would expect. In this spirit, General Electric conducted a very interesting experiment with the purpose of promoting giving up smoking, with the possibility of getting a reward for it (Volpp et al., 2009). The study was done following the random assignment of the subjects to either the control group, which did not receive any type of stimulant, and

the treatment group, where individuals were offered $250 if they abstained from smoking for a period of 6 months or $400 for 12 months.

The results showed significant differences between the groups, the success rate being three times larger for the "financial treatment" group. However, a closer look at the results shows very low success rates (14.7% in the treatment group, compared to 5% for the control for a period of 12 months, and 9.4% compared to 3.6% for a period of 18 months). The statistical difference is important on a theoretical level; however the numbers show that money has a much lower importance than what we would be tempted to believe.

This impact proves to be non-existent, especially when the changes are expressed with a lower level of precision. For example, in a study, conducted in Northern Ireland, aimed at encouraging a healthier lifestyle in the workplace (Hunter et al., 2013), the researchers worked in a manner similar to the quitting smoking experiment: the subjects in the treatment group were monitored, for a period of 12 weeks with a follow-up after 6 months, in order to record the level of physical activity and, in return, they received a card which they could use afterwards in order to get different rewards. On the other hand, the subjects in the control group went through the same monitoring procedures without receiving any type of reward for it. In this case, the final data showed no significant difference between the two groups with respect to physical activity, suggesting the need to implement a different type of stimulant, either separate or along with a financial one.

Besides these examples which clearly show a lack of total efficiency, if not low or completely non-existent, of these financial stimulants, the market approach which includes them raises, in the case of healthcare, a number of structural concerns. First of all, these interventions can easily lead to moral hazard issues in the sense of encouraging a total lack of individual responsibility towards personal health. If we were to consider the financing source for these programs, the perception being much more acute when discussing public funds, but the situation is the same for private sources as well, the negative arguments can take on a type of lack of correctness or fairness towards less fortunate individuals who are sicker due to reasons independent of them, or without the possibility of establishing a strong link such as in the case of smoking of lack of physical activity. And finally, the basic argument, that shows up repeatedly, which is that maintaining a good level of health relies on changing personal attitudes, and this is something which cannot be done, in a sustainable and realistic manner, through monetary payments.

CONCLUSION

Despite the bold title, the purpose of this paper was not to question the utility or the need of basic healthcare packages. What we wanted to point out is that too often we rely on causes beyond our control simply because we have come to consider them as being obvious. The system needs better financing, optimization and somebody will have to do this one day. However, by focusing only on this perspective we risk externalizing authority and accentuating our lack of control and powerlessness. There are moments when the simple option, which we can use at any time, such as access to medical services, makes us postpone using them and so amplifying both the costs and the associated pain.

Let us not forget that, just because something is available, it does not mean that it is actually being used. And it is up to us to do better. Many healthcare systems are confronted with the same problems, indifferent of the amounts that are invested, the infrastructure that is used or the medical personnel that

they have access to. These problems are generated by human nature, by our lack of rationality manifested in areas which do not offer a benefit.

This paper underlines a few of the problems which might show up when individual behavior contradicts (most of the time unintentionally and unknowingly) the general objectives of governmental intervention and explains a few of the ways in which simple and non-expensive changes in choice architecture can correct these inefficiencies. Furthermore, we wanted to show that, even if the financial elements are the most obvious signs of involvement and are considered sufficient motivation to change the behavior of a person, when it comes to levels of patient adhesion to different treatment plans they do not go up – at least not as much as one would expect – simply because they received some type of reward.

Of course the studies brought up can be surprising and the results, which have been presented, can create the impression that they are counterintuitive. Until similar studies are conducted in Romania it is impossible to know whether there are differences in our behavior when compared to developed countries. However, until behavioral economics in the area of healthcare becomes an area of active research in Romania, we will close by saying that small changes in our day to day behavior can lead to improvements which will have a significant and long term impact on our level of health.

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Section 3
Healthcare Administration

Chapter 15
The Determinants of Health Expenditures in Tunisia:
An ARDL Bounds Testing Approach

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ABSTRACT

This article examines the determinants of health expenditures in Tunisia during the period 1961-2008, using the Autoregressive Distributed Lag (ARDL) approach by Pesaran et al. (2001). The results of the bounds test show that there is a stable long-run relationship between per capita health expenditure, GDP, population ageing, medical density and environmental quality. In fact, on the one hand there are the short-run and long-run results which reveal that health care is a necessity, not a luxury good. On the other hand, results of the causality test show that there is a bidirectional causal flow from health expenditures to income, both in the short and in the long run.

1. INTRODUCTION

Since the 1960s, the increase of health expenditure has caused much concern all over the world. A number of studies have attempted to explain the rise in health expenditures and suggested what variables can be influenced to reduce the costs. All of these studies have considered the approach of the demand function to specify their models. Specifically, health care expenditures are hypothesized to be a function of real per capita income and other non income variables.

The non income factors have been identified in literature. So, what may affect the increase of health expenditures are the following:

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- The demographic growth: care consumption and age are clearly linked. Therefore, indicators such as the proportion of the young (e.g., under 15 years old) and old people (e.g., above 65 or 75 years old) over the active or total population have been traditionally flagged as important factors in explaining variations of health care expenditure. However, little evidence exists about the significant effect of these variables (Grossman, 1972; Leu, 1986; Hitiris and Posnett, 1992; Di Matteo, 1998; Felder et al, 2000).
- The technological progress: since the works of Manning et al. (1987) and Newhouse (1992), the rapid technological progress has been seen as a factor of supply and demand who explains the growth of health care expenditure. However, due to the difficulty of finding an appropriate proxy for the changes in medical care technology, very few studies have attempted to study the relationship between the technological progress and health care expenditure. A number of proxies have been considered in literature, such as the surgical procedures and the number of specific medical equipment (Baker and Wheeler, 2000; Weil, 1995), the R&D spending specific to health care (Okunade and Murthy, 2002), life expectancy and infant mortality (Dregen and Reimers, 2005). Some other papers have investigated the effect of the technical changes by adding a time index or time-specific intercepts in the regression specification (Gerdtham and Lothgren, 2000; Di Matteo, 2004).
- The role of the real prices in determining the demand for health care is essential (Grossman, 1972). The various studies on the determinants of health care service noted that "a change in the volume of health expenditure is not sufficient to explain the evolution of the share of expenditure in the GDP" (Bac et Cornilleau, 2002). The increase in this price of heath expenditures may result in raising either the quantities of the consumed medical care or the prices of the health sector. The importance of any factor differs from one country to another. However, there is a little empirical consensus on the effect of the real prices on the health care expenditure. This consensus may be explained by the increasing prices of health services compared to other prices since wages in low productivity sectors must keep up with those in high productivity ones (Hartwig, 2008; Okunade et al., 2004),report a positive and statistically significant effect, while (Baumol,1967,Gerdtham et al., 1992; Murthy and Ukpolo, 1994) report an insignificant effect. Hartwig (2008, p.6) asserts that "…we have to recognize that medical care price indices can not probably be relied on as deflators or explanatory variables." In fact, since the studies argue that given the paucity of data on price, the diverse national schemes of price regulation and the problems in measuring the quality of health care in obtaining this medical price index, we decided not to use this variable in our empirical analysis.
- The medical density, which is defined by physicians as per thousand population and used to account for the supply of healthcare, can be considered a cause of the increase in the health expenditures (Delattre and Dormont, 2005; Murthy and Okunade, 2009). This led to the hypothesis of the induced demand which reflects the excess supply of services due to an increase in demand initiated by patients. Theoretically, induced demand is generated by the monopoly of the medical knowledge of doctors associated with the low sensitivity of patients to prices. The excess supply of care can then contribute to higher health costs depending on different modes of organization of health care systems.
- Institutional factors: the rise of health expenditure could come from taking the institutional factors into consideration. Two approaches are used. The first distinguishes the effects of instructions of remuneration. The second distinguishes the effects of the type of national health system (e.g.,

contractual system or integrated system). According to Mahieu (2000), the overall consideration of the specific institutional leads to larger gaps, the time trend is higher for the repayment system (1.52%) than the two other systems (0.59% for the integrated system, 0.68% for the contract system). Azizi and Pereira (2005) confirm that expenditure growth is stronger in countries where the method of repayment is dominant.

To summarize, except for income which has been recognized as an important determinant of health care spending, there are no other factors which explain the variation in per-capita health expenditure. Indeed, this failure can be explained by the limited availability of health care data at the macro level, others studies even blame the weakness of the econometric methods already used (Wilson, 1999).

Therefore, the present paper differs from the existing studies on the determinants of health expenditures in three different ways. Firstly, the proposed methodology for cointegration is the ARDL approach. One reason for preferring the ARDL bounds testing approach is that the critical values produced by Pesaran et al. (2001) allow for the inclusion of a mix of I(0) and I(1) variables in the cointegrating relationship. The statistics underlying this procedure is the familiar Wald or F-statistic in a generalized Dickey-Fuller type regression, which is used to test the significance of the lagged levels of the variables under consideration in a conditional unrestricted equilibrium error correction model (ECM) (Pesaran, et al. 2001, pp. 289-290). Another reason is that the ARDL approach is more robust and performing better for small sample sizes than other cointegration techniques. Secondly, we will introduce and test the relevance of the environmental quality in this study. It is detrimental to human health that affects the society not only in terms of loss of quality of life, but also in terms of expenditure on health care (OECD Environmental Outlook, 2001). Finally, this study attempts to examine the presence of a long run equilibrium relationship and causality between health expenditure and its determinants using the ARDL bounds testing procedure.

The remainder of the paper proceeds as follows: Section 2 provides an analysis of health expenditures in Tunisia. Section 3 provides methodological and data description. Section 4 reports the empirical results of this study. Section 5 gives our concluding remarks.

2. HEALTH EXPENDITURES IN TUNISIA

2.1. Evolution of Health Expenditures

According to World Health Organization, the total health expenses are the sum devoted to the public and private health sectors. It covers the provision of health services (preventive and curative), the family planning activities, the nutrition activities, and the emergency aid designated for health but does not include provision of water and sanitation.

In Tunisia, like in many other middle-income countries, health expenditures has increased dramatically during the past two decades. Over the period 1961-2008, the total health spending increased threefold from 78 to 2891 million TND (Figure 1).

Not only has health expenditures increased in absolute terms, but in relative terms as well. The share of the GDP allocated to health increased from 4.2 percent in 1985 to 5.6 percent in 2008. The State's share of the total health expenditures as a percent of the GDP remained relatively stable at around 2 percent for the period (1990-1995); then later it dropped to 1.7 percent in 2000 and 1.6 percent in 2008

Figure 1. Total health expenditures, 1961-2008 (million TND)

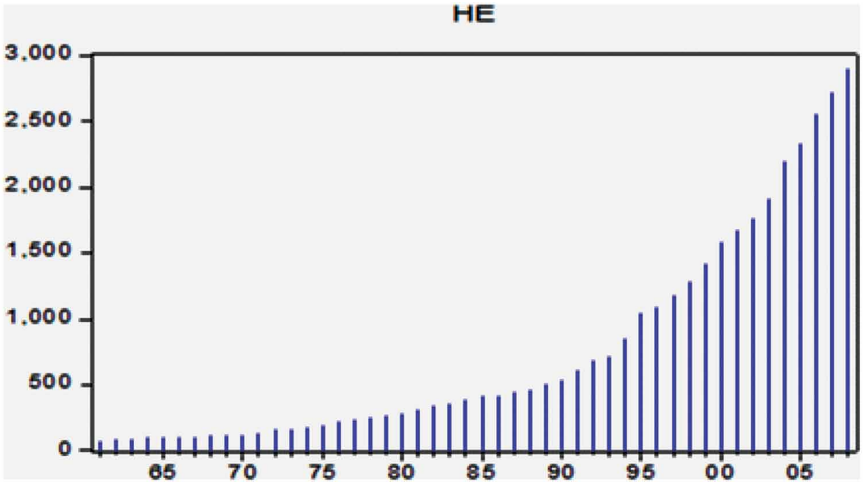
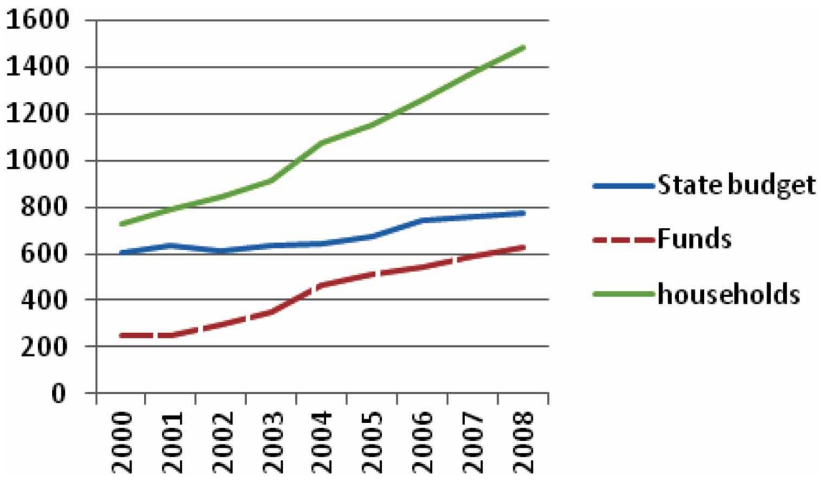


Figure 2. Trends in health-care expenditure by funding sources (TND millions)



as a result of the significant contributions of the National Social Security Fund[1] due to the substantial increase in social and health insurance coverage that went up from 53 percent in 1987 to 92percent in 2008, thus decreasing considerably the number of indigents that used to be covered by the State.

2.2. Financing of Health Expenditures

There are three major sources of financing for health expenditures (Figure 2):

- With the financing the budget by the State: from 2000 to 2008, there has been an average growth rate of health expenditures funded by the State 3 percent. However, despite this increase in financing by the State, the relative contribution by the State to health care has dropped from 38 percent to 26.9 percent.

- With the financing through the social security schemes: From 2000 to 2008, there has been an average annual increase rate of health expenditures by social security of 11 percent with an increase in the share of the total spending from 16 to 21.7 percent.
- With the Private financing includes individual spending (reimbursed and not reimbursed by private insurances or *mutuelles*) and spending from occupational health and curative health from firms. The largest portion of the expenses is spent directly by households and because of the lack of information; it is very difficult to separate these. From 2000 to 2008, the estimated average annual increase rate of private health expenditures was 8.3 percent and an increase in total health spending contribution from 46 percent in 2000 to 51.4 percent in 2008.

3. METHODOLOGY

Following Pesaran *et al*. (2001), we consider the vector auto-regression of order *p (VAR(p)),* for the following determinants of health expenditures function:

$$\mathrm{Z} = \grave{\imath}_0 + \acute{a}\mathrm{t} + \sum_{\mathrm{i}=1}^{\mathrm{p}} \hat{\mathrm{a}}_{\mathrm{i}} \mathrm{Z}_{\mathrm{t}-1} + \mathring{\mathrm{a}}_{\mathrm{t}}, \quad \mathrm{t} = 1,2,\ldots,\mathrm{T} \tag{1}$$

With $\grave{\imath}_0$ representing a (*k+1*)-vector of intercepts (drift) and $\acute{a}$ denoting a (*k+1*) vector of trend coefficients. Further derived the following vector equilibrium correction model (VECM) corresponding to equation (1):

$$Z_t = \grave{\imath}_0 + \acute{a}t + \ddot{e}Z_{t-1} + \sum_{i=1}^{p} \Gamma_i Z_{t-1} + \mathring{a}_t, \quad t = 1,2,\ldots,T \tag{2}$$

where Δ the first-difference operator, the (*k+1*)x(*k+1*)-matrices $\ddot{e} = I_{k+1} + \sum_{i=1}^{p} \Psi_i$ and $\Gamma_i = -\sum_{j=i+1}^{p} \Psi_{\mathrm{j}}, \ \ i = 1,2,\ldots,p-1$ contain the long-run multipliers and short-run dynamic coefficients of the VECM. Z_t is the vector of variables x_t and y_t respectively.y_t is an I(1) dependent variable defined as the total health expenditures (HEXP), x_t=[*GDP, MD, POPA, EQ*] i.e., per capita GDP (GDP), medical density (MD), population ageing(POPA) and environmental quality (EQ) is the vector matrix of 'forcing' I(0) and I(1) regressors as already defined with a multivariate identically and independently distributed (*i.i.d*) zero mean error vector $\mathring{a}_t = \left(\mathring{a}_{1t}, \mathring{a}'_{2t}\right)'$, and a homoskedastic process. Further assuming that a unique long-run relationship exists among the variables, the conditional VECM (equation 2) now becomes:

$$\Delta \mathrm{y}_{\mathrm{t}} = \mu_{\mathrm{y0}} + \alpha \mathrm{t} + \beta_{\mathrm{yy}} \mathrm{y}_{\mathrm{t\text{-}1}} + \beta_{\mathrm{xx}} \mathrm{x}_{\mathrm{t\text{-}1}} + \sum_{\mathrm{i}=1}^{\mathrm{p\text{-}1}} \gamma_{\mathrm{i}} n \mathrm{y}_{\mathrm{t\text{-}i}} + \sum_{\mathrm{i}=1}^{\mathrm{p\text{-}1}} \varphi_{\mathrm{i}} \Delta \mathrm{x}_{\mathrm{t\text{-}i}} + \mathring{\mathrm{a}}_{\mathrm{yt}}, \ \mathrm{t} = 1,2,\ldots \mathrm{T} \tag{3}$$

On the basis of equation (3), the conditional VECM of interest can be specified as:

$$\begin{aligned}\triangle \mathrm{LHEXP}_{t} &= \grave{\imath}_{0} + \acute{a}t + \hat{a}_{1}\mathrm{LHEXP}_{t-1} + \hat{a}_{2}\mathrm{LGDP}_{t-1} + \\ &\hat{a}_{3}\mathrm{LPOPA}_{t-1} + \hat{a}_{4}\mathrm{LMD}_{t-1} + \hat{a}_{5}\mathrm{LEQ}_{t-1} \\ &+\sum_{i=1}^{p}\tilde{a}_{1}\triangle \mathrm{LHEXP}_{t-i} + \sum_{i=0}^{p}\ddot{o}_{1i}\triangle \mathrm{LGDP}_{t-i} + \\ &\sum_{i=0}^{p}\ddot{o}_{2i}\triangle \mathrm{LPOPA}_{t-i} + \sum_{i=0}^{p}\ddot{o}_{3i}\triangle \mathrm{MD}_{t-i} + \sum_{i=0}^{p}\ddot{o}_{4i}\triangle \mathrm{LEQ}_{t-i} + \mathring{a}_{t}\end{aligned} \tag{4}$$

where L the natural logarithm, $\grave{\imath}_{0}$ is the drift, $\mathring{a}_{t}$ the white-noise error term and $\hat{a}_{i}$. are the long run multipliers.

The implementation of the ARDL Bounds test approach (Pearson and al.2001) requires three steps. The First step is to estimate equation (4) by the OLS method in order to test for the existence of a long-run relationship among the variables. The bounds testing procedure is based on the joint F-statistics (or Wald statistics) of cointegration analysis. The asymptotic distribution of the F-statistics is non-standard under the null hypothesis of no cointegration between the examined variables. The null hypothesis of no cointegration among the variables in equation (1) is ($H_{0}:\hat{a}_{1} = \hat{a}_{2} = \hat{a}_{3} = \hat{a}_{4} = \hat{a}_{5} = 0$) against the alternative hypothesis ($H_{0}:\hat{a}_{1} \neq \hat{a}_{2} \neq \hat{a}_{3} \neq \hat{a}_{4} \neq \hat{a}_{5} \neq 0$)esaran et al.(2001) report two sets of critical values for a given significance level. One set of critical values assumes that all variables which are included in the ARDL mel are I(0), while the others are calculated on the assumption that the variables are I(1). If the computed test statistic exceeds the upper critical bounds value, then the H_{0} hypothesis is rejected. If the F-statistic falls into the bounds, then the cointegration test becomes inconclusive. If the F-statistic is lower than the lower bounds value, the null hypothesis of no cointegration can not be rejected.

In the second step, once cointegration is established the conditional *ARDL*(p_{1}, p_{2}, p_{3}, p_{4}, p_{5}) long-run model *can* be estimated as:

$$\begin{aligned}\triangle LHEXP_{t} &= \grave{\imath}_{0} + \sum_{i=1}^{p1}\hat{a}_{1}LHEXP_{t-1} + \sum_{i=0}^{p2}\hat{a}_{2}LGDP_{t-1} + \\ &\sum_{i=0}^{p3}\hat{a}_{3}LPOPA_{t-1} + \sum_{i=0}^{p4}\hat{a}_{4}MD_{t-1} + \sum_{i=0}^{p5}LEQ_{t-1} + \mathring{a}_{t}\end{aligned} \tag{5}$$

where all the variables are as previously defined. This involves selecting the orders of the *ARDL*(p_{1}, p_{2}, p_{3}, p_{4}, p_{5}) model in five variables using Akaike Information Criterion (AIC) and Schwarz Bayesian Information Criterion (SBC). In the third and final step, we obtain the short-run dynamic parameters by estimating an error correction model associated with the long-run estimates. This is specified as follows:

$$\begin{aligned}\triangle LHEXP_{t} &= \grave{\imath}_{0} + \sum_{i=1}^{p1}\tilde{a}_{i}\triangle LHEXP_{t-1} + \sum_{i=0}^{p2}\ddot{o}_{1i}\triangle LGDP_{t-1} \\ &+\sum_{i=0}^{p3}\ddot{o}_{2i}\triangle LPOPA_{t-1} + \sum_{i=0}^{p4}\ddot{o}_{3i}\triangle MD_{t-1} + \sum_{i=0}^{p5}\ddot{o}_{4i}\triangle LEQ_{t-1} + \mathring{a}_{t} + \vartheta \mathrm{ECM}_{t\text{-}1} + \varepsilon_{t}\end{aligned} \tag{6}$$

where $\tilde{a}$ and $\ddot{o}$ are the short-run dynamic coefficients of the model's convergence to equilibrium and ϑ is the speed of adjustment.

3.1. Granger Causality Test

Once the existence of a long run cointegrating relationship has been verified, the next step is to examine the short and long- run Granger causality between the health expenditures, GDP, medical density, population ageing and environmental quality.The traditional Granger's definition of causality is based on the notion that the future can not cause the past, but that the past can cause the future. According to Granger's definition of causality, a time series, X_t, causes another time series, Y_t, if $Y_t$can be better predicted (in a mean-squared- error sense) when using past the values of X_t. That is, if past values of X_t significantly contribute to forecasting Y_t, then X_t is said to Granger cause Y_t. Causality from Y to X can also be defined in the same way. That is, when the past values of X_t significantly contribute to the forecast of the future values of X_t, then Y_t is said to Granger cause X_t.

The conventional Granger causality test involves the testing of the null hypothesis that X_t does not cause Y_t and vice versa by simply running the following two regressions

$$Y_t = \acute{a}_0 + \sum_{i=1}^{n} \acute{a}_{1i} Y_{t-i} + \sum_{i=1}^{n} \hat{a}_{1i} X_{t-i} + \mathring{a}_t \tag{7}$$

$$X_t = \hat{a}_0 + \sum_{i=1}^{n} \acute{a}_{2i} Y_{t-i} + \sum_{i=1}^{n} \hat{a}_{2i} X_{t-i} + \grave{\imath}_t \tag{8}$$

where $\mathring{a}_t$ and $\grave{\imath}_t$ are the white noise error processes and n denotes the number of lagged variables.

The Null hypothesis that X_t does not Granger cause Y_t is rejected if $\hat{a}_{1i}$ are jointly significant (Granger, 1969). However, according to Odhiambo, 2004, the traditional causality tests suffer from two methodological deficiencies. First, these standard tests do not examine the basic time series properties of the variables. If the variables are cointegrated, then these tests, which incorporate different variables will be mis-specified unless the lagged error-correction term is included (Granger, 1988). Second, we test the series stationary mechanically by differencing the variables and consequently eliminating the long-run information embodied in the original form of the variables. Being opposed to the conventional Granger causality method, the error-correction- based causality test allows for the inclusion of the lagged error- correction term derived from the cointegration equation. By including the lagged error-correction term, the long-run information lost through differencing is reintroduced in a statistically acceptable way. The Granger causality model used in the current study is based on equation (6).

The existence of a long-run relationship between the variables suggests that there must be a Granger causality in at least one direction. It does not indicate the direction of temporal causality between the variables. The direction of the causality in this case can be determined only by the F-statistic and the lagged error-correction term. While the t-statistic on the coefficient of the lagged error-correction term represents the long-run causal relationship, the F-statistics on the explanatory variables represents the short-run causal effect (see Odhiambo, 2008, 2009; Narayan and Smyth, 2006). It is necessary to note that when the null hypothesis is of no cointegration, it is rejected and therefore the equation will be estimated with an error-correction term (see also Narayan and Smyth,2006; Morley,2006; Odhiambo 2009).

3.2. Data Description

The empirical analysis is based on Tunisia. The Time series data are annual and cover the period 1961-2008. The per capita health expenditures and per capita GDP are measured in the Tunisian National Dinar at 1990 constant prices. We also gathered data from the following variables that have been identified in literature as for their role in determining health care expenditure: medical density; population ageing and environmental quality proxied by nitrogen oxide emissions in kilos per capita. All the data obtained from the World Development Indicators (2006) and the National Institute of Statistics of Tunisia are converted into a natural logarithmic form before the empirical analysis.

4. RESULTS AND DISCUSSIONS

4.1. Unit Root Test

Many macroeconomic time series contain unit roots that are characterized by the existence of stochastic trends as developed by Nelson-Plosser (1982). Unit root test is significant in examining the stationary of a time series because the non stationary regressor rejects many empirical results. The existence of the stochastic trend is determined by the unit root test of time series data. In this study, the unit root is tested using the Augmented Dickey-Fuller (1979) and Phillips-Perron tests (1988).

Table 1 and 2 present the results of the ADF and Phillips-Perron tests. The order of integration is tested at 5% significance level and the critical values obtained from Mackinnon (1991) Tables. The results are robust regardless of the lag length.

The results obtained show that after differencing the variables once, they are confirmed to be stationary. The ADF and Phillips–Perron tests applied to the first difference of the data series reject the null hypothesis of non-stationarity for all the variables except for the environmental quality used in this study. Therefore, it is worth concluding that all the variables used in this study are not I(2).

Table 1. ADF unit root tests results for stationarity of the variables

	Levels		**First Difference**	
Variables	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
LHEXP	1.159	*-2.360*	-7.458***	-7.645***
LGDP	1.903	*-0.344*	-5.556***	-5.888***
LPOPA	-0.139	*-3.414**	-3.648***	-3.810**
MD	3.206	*-0.576*	-5.855***	-7.845***
LEQ	-4.638***	*-6.279****	-12.822***	-14.262***
***Significant at 1% level,** Significant at 5% level,* Significant at 10% level.				

Table 2. Phillips–Perron (PP) unit root tests results for stationarity of the variables

	Levels		First Difference	
Variables	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
LHEXP	1.423	-2.360	-7.459***	-7.653***
LGDP	1.764	-0.529	-5.583***	-5.888***
LPOPA	0.893	-3.021	-2.896*	-2.497
MD	4.511	-0.009	-6.082***	-8.006***
LEQ	-6.638***	-5.537***	-12.969***	-16.803***
***Significant at 1% level,** Significant at 5% level,* Significant at 10% level.				

4.2. Co-Integration Test

The next step is to investigate whether the total health expenditures, GDP, population ageing, medical density and environmental quality share a common long run relationship. To achieve this, as explained earlier, we test the presence of the long run relationship in equation (5). Before we proceed to the calculation of the F-test statistic, an important step is conducted to establish the optimal lag length to be used in the cointegration analysis. In order to find the optimal length of the variables, several lag selection criteria, such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC) and Hannan–Quinn Criterion (HQC), are utilized at this stage. Using the SBC, we find that the optimal lag is 1 for this exercise. We find that there is a long run relationship between the variables when health expenditure is a dependent variable because its F-statistic, which turns out to be 5.508, is higher than the upper bound critical value of 3.74 at 1% level of significance. This implies that the null hypothesis of no cointegration among the variables in equation (5) cannot be accepted. The diagnostic test results of equation (5) are also displayed in Table 3.

The estimated long run elasticity of the total health expenditures with respect to the real GDP, the population ageing; the medical density; the environmental quality for equation 1, are presented in Table 4.

Based on the results of model ARDL, our main findings can be summarized as follows.

First, we notice that, except for the medical density, all the variables are statistically significant determinants of the total health expenditures. Although the real GDP appears with a positive and statistically significant elasticity, it significantly allows explaining a high proportion of the variability of the latter, but with elasticity less than 1, where health care is a normal good in Tunisia.

Table 3. Bounds F-test for cointegration

Null Hypothesis: No Cointegration
Computed F-statistic 6.65270***
Bounds Critical Values lower upper 1% significance level 3.74 5.06 5% significance level 2.86 4.01 10% significance level 2.45 3.52
Notes: The reported bounds critical value are taken from Pesaran et al. (2001), Table C1(v) CaseV:unrestricted intercept and unrestricted, p.301

Table 4. Long run elasticities based ARDL model

Variables	**Coefficient**	**Prob**
LGDP	0.730241994	0.00009255***
LPOPA	0.645185376	0.00037836***
MD	0.041880295	0.53815307
LEQ	0.329826401	0.00107826***
Intercept	-3.299712716	0.00015359***
Trend	-0.006783025	0.16523609

*** Significant at 1% level, ** Significant at 5% level.

Table 5. Granger causality results

Variables	Coefficient		Prob.	
Long run causality				
LGDP(-1)	0.843272257		0.00000524***	
LPOPA(-1)	0.465363579		0.54717818	
MD(-1)	-0.117523643		0.21783497	
LEQ(-1)	0.095352904		0.23284449	
ECM(-1)	-0.728914319		0.03102194**	
Intercept	-0.001406000		0.87394690	
Trend	0.000373325		0.18516454	
Short run causality results (Wald test)	LGDP	LPOPA	MD	LEQ
LHEXP	3.225**	2.201	2.065	1.679
** Significant at 5% level, ***Significant at 5% level.				

Therefore, by specifically examining the health care as funded by the public sector, we find that on the basis of income elasticity, it is a 'necessity' rather than a luxury good. This evidence, which is in line with some previous researches (Di Mateo and Di Matteo, 1998), indicates that when examining health care expenditure, significant differences emerge if expenditure is shared between the public and the private sectors. However, the positive and significant sign of the coefficient for the GDP might be capturing some evidence of the Wagner law, according to which the public expenditure expands with the economic development.

Second, in accordance with literature, the Tunisian population ageing will result in higher real per capita health expenditures with an elasticity of 0.64. This important elasticity can be explained by the demographic and epidemiologic transitions that are underway in Tunisia and which will strain government's finances over the next several decades. It can be explained by two factors commonly suggested, the compression of morbidity and the institutional rationing of health expenditures. Another explanation is that the proportion of the old people and death rates do not always move in the same direction. For the last 20 years in Tunisia, ageing has been rising, but the crude death rates have been falling. However, to the extent that the health costs are related to the period before death, the falling death rates would have reduced the impact of ageing.

Third, the sign of the coefficient on the medical density is positive. The per-capita health care spending is expected to rise as the number of people per physician rises. The latter result may lead to a potential supply-induced demand problem and the physician-patient agency relationship.In fact, practitioners are paid on a fee-for-service basis; consequently there may be an incentive to expand the number of services provided to patients as physician density goes up.

Finally, our results show that there is a positive and no significance relation between the environmental quality and the health expenditures. It can be concluded that a 1% increment in environmental quality that leads to increase in health expenditures. With the economic growth in Tunisia, the consumption of crude oil, gasoline, kerosene, diesel, and fuel oil will increase. Our findings imply that economic growth will come at the cost of the environmental degradation, thus heightening the risk of pollution-induced health diseases, including mortality. This implies that if the proportion of health expenditure goes to caring for those affected by deterioration in environmental quality, then there are less funds available to cater for upgrading the environmental quality and, if this process continues, it is likely to lead to more pressures on government budgets.

4.3. Granger Causality Analysis

Having found that there is a long-run relationship between the various variables, the next step is to test the causality between the variables under study. Causality, in this case, is examined through the significance of the coefficient of the lagged error-correction term (ECM) and the joint significance of the lagged differences of the explanatory variables using the Wald test.

Beginning with the short run effects, the population ageing, the medical density and the environmental quality are insignificant at the level of 5% in equation (6) (see Table 5). This implies that the population ageing; the medical density and the environmental quality do not Granger cause health expenditures in the short run. However, in equation (6), GDP and HEXP are statistically significant at 1% and 5% level, respectively. This suggests that there is bidirectional granger causality running from health expenditures to GDP in the short run. The short-run causality from the total health expenditures to the GDP is, however, supported by the F-test and the coefficient of the GDP variable, which are both statistically significant. The reverse causality from the GDP to the health expenditures, on the other hand, is supported by the lagged error–correction term, the F-statistic and the coefficient of the GDP variable in the model-which are all statistically significant.

Turning to the long run results we notice that the coefficient on the lagged error correction term is significant with the correct sign in equation (6) at 5% level, which confirms the results from the bounds test for cointegration (see Table 5). Thus, the long run causality from the GDP, the medical density and the environmental quality to the total health expenditures is supported by the coefficient of the lagged error correction term in equation (5), which indicates that there is a long run Granger causality running from income and non income factors to the total health expenditures.

5. CONCLUSION

This article aims at revealing the magnitude of the income elasticity and the impact of non-income determinants of health expenditures in Tunisia using the time series on per capita GDP, population aged over 60 years, medical density, environmental quality, over the period 1961-2008. This paper contributes to the literature adopting the ARDL bounds approach of Pesaran et al. (2001) which ensures that our results are robust to uncertainty about the order of integration of the variables. The empirical analysis shows that the used variables present the unit root. On this basis, the cointegration analysis was applied as suggested by bounds –F-test. The results in the short and long run, which indicate that health care is a necessity rather than a luxury in Tunisia, confirms the a priori notion that health care behavior changes with the level of the economic development. Most previous studies of the developed countries empirically found health care to be a luxury good. The GDP variable exerts statistically significant and positive effects on health care. The results also illustrate the importance of the population over age 65 and the environmental quality in the long run. The results of causality test show that there is a bidirectional causal flow from health expenditures to income, both in the short run and in the long run.

However, the policies aiming at encouraging health expenses are required to build up a healthier and productive society to support the Tunisian's economic growth and development. In addition, the Ministry of Health should minimize the gap of inequality distribution of health care among people considering the spread of emerging chronic diseases and assuring the quality and performance of public health sup-

ply. Moreover, the external cooperation of the World Health Organization is also required to make an exchange of expertise and health care information.

Future researches on the topic could consider other determinants of healthcare expenditures such as the relative price, the technological progress, or the measure of morbidity and inference about the trends in the mixed health sector in Tunisia. The structure of this mixture has been the centre of the debate of whether increasing centralization or privatization would yield more efficient outcomes. A larger data set may also be beneficial in future researches.

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ENDNOTE

[1] Since July 2007, The National Health Insurance fund

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Chapter 16
Health Expenditure: Short and Long-Term Relations in Latin America, 1995-2010

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ABSTRACT

This chapter explores the factors associated with the growth of total health expenditure, in addition to its main components, government health expenditure and out-of-pocket payments. Results suggest that health expenditure in general does not grow faster than gross national product (GNP). No difference is found in health expenditure between tax-based and insurance-based health financing mechanisms. The authors confirm the existence of fungibility, where external aid for health reduces government health spending and out-of-pocket payments from domestic sources. The study also finds that government health expenditure and out-of-pocket payments follow the same paths in time, but are different for countries at different levels of economic development and the same for health expenditure growth. In Latin American countries, the relationship between health expenditure and GNP per capita is positive; there is a quick adjustment in the short run to obtain long-run behavior.

INTRODUCTION

According to World health report, regarding the total expenditure on health, 10.1% of gross domestic product (GDP) was spent in 2012, 17.9% of GDP was out-of-pocket payments (OOP), and US$1,027 per capita was spent on health. When people use health services, around 150 million each year suffer severe financial hardship as a result of paying health services. In a health spending projection, Sisko et al. (2009) calculated an average annual growth of 6.2%, 2.1 percentage points greater than the average annual growth in gross Domestic Product GDP, so health expenditure is a matter of great importance for each region and person.

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Across the world there are great variations in the amount countries spend on health. In high-income countries, per capita health expenditure is over US$3,000 on average, while in resource poor countries it is only US$30 per capita. Some countries spend more than 12% of GDP on health, while others spend less than 3%. Of total expenditure on health, 17.7% was out-of-pocket payments in year 2010. World Health Statistics (WHO, 2013) states that for year 2010, the per capita total expenditure on health for lower-middle-income countries was US$152, for upper-middle-income countries it was US$598 dollars, for low-income US$ 63, and for high-income it was US$4,612 dollars. The per capita government expenditure on health in 2010 was US$24 for low-income countries, US$55 for middle-income, US$332 for upper-middle-income, and US$2,850 for high-income.

BACKGROUND

Since the seminal work by Newhouse (1977), much research has examined the relationship between health-care expenditure and GDP. Income per capita GDP has been identified as a very important factor for explaining differences across countries in the level and growth of total health care expenditure (Kleiman, 1974; Newhouse, 1977; Leu, 1986; Getzen, 2000). For Latin America, Govindaraj et al. (1997) estimated in 1990 that countries had an average per capita health expenditure of US$162; on average, countries spent 6.2% of their GDP on health. Lustig (2000) presented a particular concern, that spending on primary education and health, and spending on programs that target the poor tend to be cut back along with other government expenditure. For the case of Chile and Colombia, Homedes and Ugalde (2005) confirmed the neoliberal reforms by the International Monetary Fund (IMF) and the World Bank; they are the overt actors that promote the reforms, according to Stiglitz (2002), as privatization and decentralization do not improve the quality of health care, equity, and efficiency.

Most of the research has been performed for developed countries, Schieber and Maeda (1999) calculated income elasticity at 1.13, and higher for public spending than for private spending.. Musgrove et al. (2002) found that income elasticity of total health expenditure was between 1.133 and 1.275. Income elasticity for OOP ranged from 0.884 to 1.033, while it was between 1.069 and 1.194 for government health expenditure. Hall and Jones (2004) argued that health care is a superior good because as individuals get richer, they choose to spend a larger proportion of their income on health care, while van der Gaag and Stimac (2008) stated that income elasticity for total health expenditure was 1.09 and found that income elasticity was less than one in the Middle East and greater than one in Organisation for Economic Co-operation and Development (OECD) countries. Murthy and Okunade (2009) found that income elasticity was between 1.089 and 1.121.

Most recently, Yerdelena (2011) showed that an increase in health expenditure causes an increase in economic growth for all countries in the short and long run. Koivusilta et al. (2013) found a strong mutual interaction between school achievement and adoption of health-compromising (HCB) and health-enhancing (HEB) behaviors in early and late adolescence. Both hypotheses acknowledged the crucial role of family background. The pathway from health behaviors in adolescence to adult education runs through a person's school career. One of the mechanisms leading to health inequalities in adulthood Koivusilta et al found was the interplay between behaviors and educational pathways in adolescence. Jalal and Khan (2014) noted that there is improvement in life expectancy with increasing gross national income (GNI) per capita and GDP because where there are fewer resources, people are much less healthy

than those living in rich countries. Fedeli's (2014) results show that health expenditure for the long and short-term provides an empirical support for the existence of Wagner's law.

Government expenditure in health has been analyzed by several authors. Lu et al. (2010) examined the effects of official development aid (ODA) on health spending in low and low-middle-income countries and found that GDP per capita had no significant relationship to government health expenditure as a share of GDP. Additionally, Lu et al. used human immunodeficiency virus (HIV) seroprevalence as a proxy and found that it also had no significant relationship to government health expenditure. Another study (Farag et al., 2009) examining the fungibility of ODA for health and domestic government health expenditure based on panel data found that a 1% increase in GDP was associated with a 0.66% increase in domestic government health expenditure in low-income countries and a 0.96% increase in middle-income countries. Farag et al. (2013) found that government health spending had a significant effect on reducing infant and child mortality, and the size of the coefficient depended on the level of good governance achieved by the country, indicating that good governance increased the effectiveness of health spending.

Population age structure is often included as a covariate in health expenditure regression. Commonly used indicators are the share of young people, or those under 15 years old and old people over 60 or 65 years old across the active or total population. These variables are generally insignificant when included in regression models explaining per capita health spending (Leu, 1986; Hitiris & Posnett, 1992; L. Di Matteo & R. Di Matteo, 1998). Epidemiological need is sometimes also incorporated as a covariate through various proxies. Xu et al. (2011) used tuberculosis (TB) prevalence as a proxy and found TB prevalence was associated marginally with total health expenditure in upper-middle-income countries.

In terms of a financing structure, very few empirical studies found that the extent to which health care expenditure was financed by the government had a relationship with levels of health expenditure (Leu, 1986; Culyer, 1988; Hitiris & Posnett, 1992; Van der Gaag & Stimac, 2008). Differences in health expenditure between tax-based and social insurance-based systems were examined in OECD countries and eastern European and Central Asian (ECA) countries (Wagstaff & Bank, 2009; Wagstaff & Moreno-Serra, 2009). The OECD study found that health expenditure per capita was higher in countries where a social health insurance mechanisms exists. The ECA study suggested that per capita government health expenditure was higher in countries with social health insurance as compared to countries that relied solely on general taxation.

Recently, there has been much interest in the relationship between external funds and national health expenditure in developing countries. Van der Gaag and Stimac (2008) found that, while there was no significant impact of health-specific ODA on total health expenditure, health specific ODA had an elasticity of 0.138 for public spending on health. Lu et al. (2010) found that health ODA channeled through the non-government sector had a positive relationship with general government health expenditure, while a negative correlation was found when it was channeled through the government sector. Farag et al. (2009) found that for a 1% increase in health ODA, government health expenditure decreased by 0.027% in upper-middle-income countries, 0.04% to 0.09% in lower-middle-income countries, and 0.14% to 0.19% in low-income countries. De Los Ríos et al. (2011) concluded that after the Millennium Summit, Development Assistance for Health (DAH) in Latin American countries did not grow, nor did it equal the trends prior to 2000, and public health expenditure followed its historical growth trend, without further increases in relation to regional GDP.

In relation to demographic variables, Malik and Syed (2012) confirmed that economic status and number of elderly members are significant positive predictors of OOP. Golinowska and Tambor (2012)

showed that OOP expenditure is highest among population groups with high health needs (elderly, disabled, and chronically ill), but also among individuals with high incomes.

Sambo et al. (2013) observed that the number of countries in Africa spending less than 5% of their GDP on health decreased from 24 to 17, government spending on health as a percentage of total health expenditure increased in 31 countries and decreased in 13 countries, countries allocating at least 15% of national budgets on health increased from 2 to 4, countries partially financing health through social security increased from 19 to 21, countries where private spending was 50% and above of total health expenditure decreased from 29 (64%) to 23 (51%), and countries financing more than 20% of their total health expenditure from external sources increased from 14 to 19.

Regarding the explanatory variables of health expenditure, in a cross-country study, Herwartz and Theilen (2010) questioned the existence of a systematic relationship between per capita healthcare expenditure (HCE) and explanatory variables, such as income, population aging, and total public expenditure. Using the age structure of the population as the state variable, they found that income elasticity increased with population age, while other explanatory variables were not influenced significantly. Additionally, they found that the HCE relationship became increasingly unstable in aging economies.

The trend in public health expenditure prior to 2000 continued its historical growth, without further increases in relation to the regional GDP (De Los Ríos et al., 2011).

Based in the previously discussed literature and following the research of Xu et al. (2011) and Salgado-Vega and Salgado-Naime (2014), this research observes the trajectory of health expenditure over time and the differences between income groups in countries. The hypotheses are: total health expenditure grew faster than income; other variables, such as income, health system, age over 65 years old, etc., are associated with the growth of total health expenditure; government health expenditure and out-of-pocket payments follow different paths; and countries with poor populations spend more on health. This chapter addresses these issues by analyzing data from 18 Latin American countries over the period 1995–2010.

As far as econometric models are concerned, the most interesting conclusions are from panel data models, both static and dynamic, as opposed to cross-section models, even those with repeated cross sections. One of the possible advantages of dynamic panel data is that it allows for the possibility of testing for exogeneity of GNP in the health care expenditure regression and examining the Granger causality issue. However, for the latter, there are serious limitations when only a short time series is available.

VARIABLES

Total current health expenditure (THE) included both public and private spending on health. External funds were automatically included as they flow through either public or private channels into national health systems. However, investments by the government and private entities were not included. There was a per capita total health expenditure in a year greater than $1,000 for Argentina, Costa Rica, Uruguay, Brazil, and Mexico; countries that spent less than $300 were Nicaragua and Honduras; nevertheless all countries in Latin America showed an increase over time for total health expenditures.

Government health expenditure from domestic sources (GOVHE) included government spending on health from general government revenue and payroll taxes. This variable has been around 50% of total health expenditure in Latin America, with a slight tendency toward an increase in the period 1995–2010, decreasing only in Costa Rica and Ecuador. Countries where government health expenditure as a per-

centage of total health expenditure was less than 50% during the period were Brazil, Chile, Dominican Republic, Guatemala, Paraguay, and Venezuela.

OOP included payments for doctor's consultation fees, medication, laboratory tests, and hospital bills. They can also take the form of user charges in general or cost sharing under insurance policies. This variable has been around 40% of total health expenditure in Latin America, with a slight tendency toward a decrease in the period 1995–2010, increasing only in Costa Rica and Ecuador. Countries with more than 50% of total health expenditure were Venezuela, Paraguay, Ecuador, and Guatemala.

GNI per capita (formerly GNP per capita) is the gross national income converted to U.S. dollars using the World Bank Atlas method and divided by the midyear population.

A country's income, often simply measured as GNP per capita, has been studied intensively among Latin American countries. The average annual GNP per capita in Latin America was around $4,000 in 1995 and $8,000 in 2010, with the highest found in Argentina, Chile, and Mexico, at more than $14,000, and the lowest in Nicaragua, Honduras, and Guatemala, at less than $5,000. Health expenditure has grown faster than income because the ratio of THE to GNP was around 6% in 1995 and 7% for 2010, decreasing during the period in Colombia, El Salvador, Paraguay, and Uruguay.

Total government expenditure as a share of GNP (GGE_GNP) reflects fiscal space for a given GNP level. We are interested in examining whether governments spend more on health when more resources are available. The Abuja Declaration is a demonstration of governments' desires to increase health spending. We expected that in low-income countries, governments would spend a larger share of their budget on health when more resources were available. This variable, in the period 1995–2010, decreased in its participation from more than 30% of total government expenditure as a share of GNP to less than 25% in Latin America. Countries with the lowest participation from the government were the Dominican Republic, Guatemala, and Mexico, with a percentage of around 12%, and the highest participation was in Brazil, Uruguay, Colombia, and Venezuela.

Population structure would have an impact on health expenditure; the share of the population above 60 years old (POP_60) was used here. A positive correlation is expected between an aging population and health expenditure, particularly for upper-middle-income countries where population aging is advancing rapidly. For middle-income countries, aging is not a dominant issue and we would not have expected health spending to react to increases in the elderly population, particularly for government health expenditure. The average of this variable in Latin American countries was around 7% and increasing for all countries; the countries with more of their population over 60 years old were Uruguay, Argentina, and Chile, and with less of their population over 60 years old were Honduras, Guatemala, and Nicaragua.

Disease patterns have a direct link with the number and types of health services that are required. For infectious diseases, we used the incidence of tuberculosis per 100,000 people (TB) as a tracer for disease prevalence. It was expected that governments would devote more domestic resources to health in response to high TB incidence in middle-income countries. The tuberculosis incidence was less than 100 in Latin America and descending, the highest incidence was in Bolivia, Peru, Ecuador, and Guatemala, and the lowest in Mexico and Costa Rica.

The way a health system is organized, in particular the design of health financing functions, is likely to have an impact on health expenditure. We included OOP as a percentage of THE (OOP_THE) in the regression of total health expenditure. A larger share of prepayment would allow better access to services, which in turn may increase utilization and total health expenditure.

To observe if tax-based systems or insurance-based systems perform better in a group of countries, we included a set of dummy variables. The social health insurance system creates three categories (social health insurance dominated system, mixed system, and tax-dominated system) in two dummy variables (D1 and D2):

Insured-based system
D1 = if social security expenditure on health as a percentage of general government expenditure, social health insurance-dominated system
D1 = 0, others, if social security expenditure on health as a percentage of general government expenditures, mixed system
D2 = 1 if social security expenditures on health as a percentage of general government expenditure, tax-dominated system
D2 =0, others, if social security expenditure on health as a percentage of general government expenditure, mixed system

The social health insurance system was used as a reference group. We would not expect to see significant differences between a tax-funded system and social health insurance system because they both perform similar pooling functions. The social health insurance system is dominant in Brazil, Chile, Dominican Republic, Honduras, and Nicaragua; the tax-based system is dominant only in Costa Rica, and the mixed system in Guatemala.

Substitution among different components of health expenditure, OOP, GOVHE, and external funds (EXT) were included in the respective equations to test for substitution effects. External funds mainly occur in middle-income countries because a few upper-middle-income countries receive external funds for health. External funds per capita in Latin America in 1995–2010 was about $5 per capita and increasing, with $10 per capita or more Nicaragua, Bolivia, Honduras, Paraguay, and Peru.

The poverty gap (POVERTY) is the difference between the average income of the poor (or extremely poor) population and the poverty (or extreme poverty) line expressed as a proportion of the value of the former (Spiker et al., 2007). The average poverty gap in Latin America moved from 15% in 1995 to 20% in 2010. The highest poverty gaps were in Honduras, Nicaragua, Guatemala, and Bolivia, with more than 25%; and the lowest in Uruguay, Chile, and Costa Rica, with less than 9%. In most cases the value of extreme poverty lines in Latin American countries exceeds in magnitude the line corresponding to $1 per day.

The variable time (TIME) was also explored to assess whether health expenditure had grown over time. Health expenditure has risen because governments and people continue to place a higher importance on health and health care, and as such, there is an increase in health care costs.

We also used the World Bank's country income group classification of April 2012. The two income groups were lower-middle-income (inc1) countries with an average per capita GNI of $3,159 in 1995–2010: Bolivia, El Salvador, Guatemala, Honduras, Nicaragua, and Paraguay; and upper-middle-income (inc2) countries with an average per capita GNI of $8,342: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Panama, Peru, Dominican Republic, Uruguay, and Venezuela.

Thus, we generated a country income dummy variable:

Inc = 1 if country belongs to a upper-middle-income group
Inc = 0 if country belongs to middle-income group

Summary statistics of these variables are presented in Table 1.

Total health expenditure as a share of GNP over time by different country income groups ranged from 1.5% up to almost 12%. At any given point in time, cross-section data showed the general trend of higher-income countries having higher health expenditures. Prominent upward trends for 14 countries and downward trends over time were observed for Colombia, El Salvador, Paraguay, and Uruguay.

General government expenditure on health and OOP as a share of GNP, as expected, showed opposing trends for these two variables, where government expenditure on health was higher in higher-income countries, while OOP were lower. For GOVHE, the median level in all Latin American countries was around 1.6% of GNP, while for lower-middle-income countries it was 3% and for upper-middle-income it was 1.3%. By contrast, for OOP, the median share was around 2.3% of GNP for all Latin American countries, while it was around 2% in lower-middle-income countries and 2.2% in upper-middle-income countries, so there were no notable differences in this variable. The trend in GOVHE as a percentage of GNP was negative for all countries except Bolivia; meanwhile, OOP as a percentage of GNP trends were positive for 13 countries and negative for 5: Colombia, Ecuador, Guatemala, Nicaragua, and Paraguay.

General government expenditure on health as a share of total government expenditure ranged from 0.07% to over 10%. There was considerable overlap among country income groups, but in general, higher-income countries seemed to devote a larger government budget share to health. There is evidence of this share increasing over time, except for Argentina and Bolivia. It is worth noting that only a few countries allocated more than 10% of the government budget; Brazil, Costa Rica, Panama, and Uruguay allocated around 10%, while Bolivia, Guatemala, and Paraguay allocated only around 1%. This occured despite commitments such as the Abuja Declaration of 2001, where African Union countries meeting in Abuja, Nigeria, pledged to increase government funding for health to at least 15% and urged donor countries to scale up their support.

Table 1. Summary statistics

Total for Latin America												
	GNP per Capita	THE per Capita	GOVHE per Capita	OOP_THE	External Funds per Capita	GGE_GNP	OOP_THE	POP_60	TB	POVERTY	D1	D2
Mean	6752.6	472.1	261.1	166.9	5.4	0.0	2.9	0.1	90.9	19.6	0.17	0.43
Median	6530.0	429.5	195.5	151.2	3.8	0.0	2.7	0.1	62.5	20.0	0.00	0.00
Maximum	15570.0	1386.0	1028.0	451.8	36.9	0.5	19.9	0.2	330.0	47.4	1.00	1.00
Minimum	1320.0	40.0	38.0	21.5	0.0	0.0	0.2	0.1	18.0	2.2	0.00	0.00
Std. Dev.	3181.4	287.1	189.9	94.7	6.4	0.1	1.7	0.0	69.0	10.5	0.38	0.50

Source: National Health Accounts (NHA) database of the World Health Organization, World Bank, and UNECLAC.

In economics, the Baumol Effect, or cost-disease (Baumol 1967, 1993, 2012), is important. It is the tendency for relative prices of some services to increase vis-à-vis other goods and services in the economy, reflecting a negative productivity differential and the equalization of wages across sectors. With a price-inelastic demand, the share of health care expenditure of GDP would tend to increase over time (Hartwig, 2008). In Latin American countries in the time period 1995–2010, Colombia, El Salvador, Paraguay, and Uruguay had a decreasing share of health care expenditure of GNP over time. For the remaining countries, the percentage of total health expenditure of GNP increased over time, so assuming a price-inelastic demand, the share of health care expenditure of GNP increased over time, showing the Baumol Effect. Furthermore, the average general price index rose 84.1% in all Latin American countries and the health price index grew by 96.8% during the period January 1995 to June 2012 (UECLAC, 2012), so the relative price of health increased more than the general price. Of course, there were countries where the health price index grew less than the general price index and these were Brazil, Dominican Republic, Ecuador, Nicaragua, Panama, and Paraguay.

ECONOMETRIC METHODS

The standard static fixed effects panel model allows for variable intercepts to represent country effects. The model takes the following general form, where *i* represents a country, and *t* represents a year:

$$y_{it} = \beta' x_{it} + v_i + e_{it} \tag{1}$$

This equation represents the effects of those variables particular to the *i*th country that are invariant over time. We assume that the country effects are fixed rather than random. This is essentially because the differences between countries are due more to the mean of the dependent variables than to their variance. We also assume that v_i is uncorrelated with e_{it} and that x_{it} is a strictly exogenous vector of variables.

In the specifications below, β is a vector of coefficients for the vector of variables x_{it}. Overall, the fixed effects model, also called the analysis of covariance model, was used to run the three multivariate regressions described in the following. Interaction terms between country income dummies (INC) and covariates were used to examine different effects in different country income groups.

PANEL CROSS SECTION FIXED EFFECTS

Results showed that GNP increases led to increases in total health expenditure in all income groups in the static model (Table 2). In the static model, income elasticity was close to one and had the same value (0.817) for lower-middle and upper-middle-income countries. The percentage of the population over 60 years old had a negative relationship with total health expenditure in middle-income countries. By contrast, this relationship was positive in upper-middle-income countries.

In the static model, TB prevalence had a positive, but only marginally significant, effect because of its small value (-0.0017) in all income countries. There was a positive relationship between social health insurance-based systems for middle-income groups and a negative relationship for upper-middle-income groups. The relationship between the share of OOP for total health expenditure and absolute levels of

total health expenditure was found to be positive in middle-income countries and negative for upper-middle-income countries.

For government fiscal space, the relationship was not significant in total health expenditure regression. Time seemed to have a positive significant relationship for total health expenditure for middle-income countries and was negative for upper-middle-income countries. The relationship between poverty and total health expenditure was positive for middle-income groups and negative for upper-middle-income groups.

For all three models, we also carried out a Hausman test (Hausman, 1978) for the null hypothesis H_0 of random effects against the alternative H_a of fixed effects. The correlated random effects, or Hausman test with a p-value less than 0.05, states that the hypothesis for the individual effects are uncorrelated with the log of total health expenditure and must be rejected, so the model of random effects is not a good one. The calculations, which are not reproduced here, led to the rejection of $H_{a,}$ which is a strong indication of the validity of the fixed effects assumption.

For the static model equations, we performed a heteroskedasticity test between cross sections and obtained equality of variance with p-values greater than 0.5, so there is no heteroskedasticity between cross sections. We also performed the unit root test for the residuals and they cointegrated. Stock (1987) found that if the dependent variable and independent variables are cointegrated, then estimate parameters will be consistent.

GOVERNMENT HEALTH EXPENDITURE

The results from the model showed that GNP increases led to increased government health expenditure (Table 3). This result held in all country income groups, and with the same income elasticity. TB prevalence was not associated with government health expenditure in any of the income groups. The percentage of population over 60 years old was positively associated with government health expenditure only for upper-middle-income countries.

Table 2. Static model total health expenditure cross section fixed effects

Variable	Coefficient	Standard Error	t-Statistic	Probability	Middle-Income	Upper-Middle-Income
C	-37.82716	9.554905	-3.958926	0.0001	-37.82716	-37.82716
LOG(GNP)	0.981367	0.085798	11.43814	0.0000	0.981367	0.981367
POP_60	-57.4936	7.104046	-8.093078	0.0000	-57.4936	8.75817
TB	0.002095	0.000838	2.498248	0.0131	0.002095	-0.000895
OOP_THE	0.080084	0.026106	3.067651	0.0024	0.080084	-0.010833
TIME	0.060654	0.007766	7.810286	0.0000	0.060654	-0.00347
POP_60*INC	66.25177	7.864953	8.423671	0.0000		
TB*INC	-0.00299	0.000929	-3.218067	0.0015		
OOP_THE*INC	-0.090917	0.026806	-3.391601	0.0008		
TIME*INC	-0.064124	0.009258	-6.926467	0.0000		

Number of observations: 288, cross sections: 18, F-statistic: 555.52 Prob > F: 0.0000, Adj R-squared: 0.980

The constant represents general government expenditure on health in the dominated mixed system plus the differential effect of the upper-middle-income with the tax-dominated system and shows that the upper-middle-income countries expended slightly more than the mixed system; both systems had a positive relation with general government health expenditure. The social health insurance-based system was not significant.

A larger share of government expenditure of GNP was associated with less government health expenditure in the static model only for upper-middle-income countries. When OOP increased, government expenditure decreased in upper-middle-income countries. Time had a positive significant relationship with government health expenditure in middle-income groups and a negative rate of growth for upper-middle-income groups.

OUT-OF-POCKET PAYMENTS

Similar to government health expenditure, the results showed that GNP increases seems to lead to increases in OOP (Table 4). In the static models, income elasticity was smaller than one in lower-middle and upper-middle-income countries. TB prevalence was marginally associated, that is, near zero in relationship to OOP, positive in the model for middle-income groups, and negative for upper-middle-income groups.

The population over 60 years old was positively associated with OOP for upper-middle-income countries in the model and negatively associated for middle-income groups. Government health expenditure had a negative association with upper-middle-income groups and was not significant for middle-income groups.

External funds were negatively associated with OOP only for upper-middle-income countries. The percentage of government general expenditure of GNP was negatively associated only for upper-middle-income groups.

The constant represents OOP on health in the dominated mixed system plus the differential effect of the upper-middle-income with social insurance system and shows that upper-middle-income countries expended slightly less than the mixed system. Both systems had a negative relation to OOP. The tax-based system was not significant for any group.

Table 3. Static model government health expenditure cross section fixed effects

Variable	Coefficient	Standard Error	t-Statistic	Probability	Middle-Income	Upper-Middle-Income
C	39.13856	13.52525	2.89374	0.0041	39.13856	
LOG(GNP)	0.820338	0.183059	4.481275	0	0.820338	0.820338
TIME	0.02245	0.007727	2.905585	0.004	0.02245	
POP_60*INC	21.57001	5.586038	3.861414	0.0001		21.57001
GGE_GNP*INC	-59.06788	12.99155	-4.546638	0		-59.06788
TIME*INC	-0.064734	0.01115	-5.805902	0		-0.042284
D2*INC	0.210507	0.044868	4.691706	0		39.349067
LOG(OOP)*INC	-0.104884	0.052274	-2.006415	0.0458		-0.104884

Number of observations: 288, cross-sections: 18, F-statistic: 344.53 Prob > F: 0.0000, Adj R-squared: 0.961

Table 4. Static model out of pocket payments cross section fixed effects

Variable	Coefficient	Standard Error	t-Statistic	Probability	Middle-Income	Upper-Middle-Income
C	-11.21866	19.61398	-0.571973	0.5678	-11.21866	-11.21866
TB	0.003501	0.001695	2.065498	0.0399	0.003501	-0.000963
LOG(GNP)	0.622936	0.268774	2.31769	0.0212	0.622936	0.622936
TIME	0.087824	0.015798	5.559194	0	0.087824	-0.034752
POP_60	-84.1748	13.51044	-6.230352	0	-84.1748	25.9484
LOG(GOVHE)*INC	-0.232165	0.089871	-2.583319	0.0103		-0.232165
TB*INC	-0.004464	0.002066	-2.160722	0.0316		
TIME*INC	-0.122576	0.019499	-6.286397	0		
POP_60*INC	110.1232	15.15772	7.265152	0		
EXT*INC	-0.013833	0.005786	-2.390831	0.0175		-0.013833
GGE_GNP*INC	-49.56638	21.60903	-2.293781	0.0226		-49.56638
D1*INC	-0.186363	0.071674	-2.600148	0.0099		-0.186363

Number of observations: 288, cross-sections: 18, F-statistic: 53.46 Prob > F: 0.0000, Adj R-squared: 0.593

DYNAMIC MODEL

The dynamic relationships that are characterized by the presence of a lagged dependent variable among the regressors are given by the equation:

$$y_{it} = y_{it-1} + \beta' x_{it} + v_i + e_{it} \quad (2)$$

We assume that e_{it} are serially uncorrelated. This assumption is testable, as we shall see in the econometric estimation presented as follows. In Equation (2), the vector x_{it} may contain strictly (or strongly) exogenous variables, in addition to predetermined (or weakly exogenous) variables or endogenous variables. Recall that a variable x_{itk} is said to be strictly exogenous if $E(x_{isk}e_{it})=0$ for all t and s for all $s \leq t$ but if $E(x_{isk}e_{it})\neq 0$ for all $s > t$, the variable is said to be predetermined. Intuitively, if the error term at time t has some feedback on the subsequent realizations of x_{itk}, x_{itk} is a predetermined variable. A variable x_{itk} is said to be endogenous if $E(x_{isk}e_{it})=0$ for all $s < t$ but $E(x_{isk}e_{it})\neq 0$ for all $s \geq t$. According to this definition, endogenous variables differ from predetermined variables only in that the former allow for correlation between x_{itk} and e_{it} at time t, while the latter do not.

We assume, as in the static framework, that the country effects, v_i, are treated as fixed rather than random. As a consequence we do not need to consider different sets of assumptions about the possible correlation of the regressors, other than the lagged dependent variable, with the individual effects.

As is well known, the analysis of covariance estimator that we used previously is inconsistent for a panel dynamic model in situations where, as in this paper, the number of time periods is small and the number of individual observations is large, whether the effects are treated as fixed or random (Sevestre & Trognon, 1985). In that case, one should resort to an alternative method. The most commonly used is the generalized method of moments (GMM), which relies on a properly defined set of instrumental

variables. These methods depend on the set of identifying or orthogonality conditions deduced from all the assumptions defining the model. For further information, see Baltagi (2008) and Harris et al., (2008).

To illustrate, consider the first difference of Equation (2), which eliminates the fixed effect:

$$y_{it} - y_{it-1} = \gamma\left(y_{it-1} - y_{it-2}\right) + \beta'\left(x_{it} - x_{it-1}\right) + e_{it} - e_{it-1} \tag{3}$$

All the strictly exogenous variables x_{itk} are valid instruments for the level Equation (2), as well as for the first difference Equation (3). Additionally, one can associate to the predetermined and endogenous variables GMM-type of instruments obtained from orthogonality conditions deduced from assumptions on these variables. By contrast, even if e_{it} are serially uncorrelated, the regressor ($y_{it\text{-}1}$–$y_{it\text{-}2}$) is correlated with the first difference model error e_{it}–$e_{it\text{-}1}$ because ($y_{it\text{-}1}$) depends on $e_{it\text{-}1}$. However, e_{it}–$e_{it\text{-}1}$ is uncorrelated with ($y_{it\text{-}k}$–$y_{it\text{-}k\text{-}1}$) for $k \geq 2$, making it possible to use lagged variables as instruments. More generally, Arellano and Bond (1991) argued that additional instruments can be obtained in models (2) and (3) if one utilizes the orthogonality conditions that exist between lagged values of (y_{it}) and the disturbances e_{it}. This is the basis of the one-step and two-step GMM estimators derived by Arellano and Bond (1991) using orthogonality (moments) conditions in which lagged levels of the dependent and predetermined variables were instruments for the first difference Equation (3).

Blundell and Bond (1998) indicated that a weak instruments problem may occur in the Arellano and Bond (1991) procedure due to the lack of correlation between the lagged values of the endogenous variables used as instruments and the regressors in the first difference model. Building on the work of Arellano and Bover (1995), Blundell and Bond (1998) proposed a "system GMM" that consists of stacking the equation in levels (2) and in first differences (3) and estimating this system using GMM. This estimator uses moment conditions in which lagged differences are used as instruments for the model in levels in addition to the moment conditions of lagged levels as instruments for the model in the first difference.

GMM (Arellano & Bond, 1991) is used to estimate the panel dynamic models described as follows. The estimations have been performed using Eviews 7.0, a class of dynamic panel data model with fixed effects (Holtz-Eakin et al., 1988; Arellano & Bond, 1991). This model is designed for panels with a large number of cross sections and a short time series that have the features that lags of the dependent variable appear as regressors and period dummy variables are commonly used to control for fixed period effects. In large T panels, a shock to the country's fixed effect, which shows in the error term, will decline with time. Similarly, the correlation of the lagged dependent variable with the error term will be insignificant (Roodman, 2006). In these cases, one does not necessarily have to use the Arellano-Bond estimator. In our models, we classified health financing and GNP as endogenous variables. On the other hand, non-health financing specific variables were considered to be strictly exogenous. The exogenous variables are incidence of TB, government expenditure as a share of GNP, percentage of population over 60 years old, and poverty gap. No variables were assumed to be predetermined.

For the unit root test for the independent variables total health expenditures, OOP and GGE, have a high p-values of (IPS), Im, Pesaran, and Shin (2003) (ADF) Dickey Fuller (1979), and PP Phillips Perron (1998), Levin. Lin and Chu (2002), this statistics show the presence of unit root, then the first difference of the variables shows not unit root and therefore are stationaries in the panel. The panel cointegration was tested with the residuals of each equation for unit root, we did not find unit roots and the residuals were stationaries and thus the panel cointegrated.

DYNAMIC TOTAL HEALTH EXPENDITURE

The GNP elasticity in the dynamic model was considerably lower and different for the income groups: 0.669 for middle-income and 0.221 for upper-middle-income (Table 5). The TB prevalence in the dynamic model was not significant and the population over 60 years old had a negative association in both group of countries, but with greater magnitude in middle-income groups. This is contrary to the results in developed countries such as Japan, where Tamakoshi and Hamori (2014) investigated the relationship between health-care expenditures, GDP, and population share of the elderly and found the coefficient of the share of the elderly was positively significant.

In the dynamic model, the relationship between the share of OOP in total health expenditure and absolute levels of total health expenditure was found to be negative in upper-middle-income countries and positive in middle-income countries. Government expenditure as a share of GNP (GGE_GNP) had a negative relationship with total health expenditure in the dynamic model for upper-middle-income groups.

DYNAMIC GOVERNMENT HEALTH EXPENDITURE

The dynamic model showed that GNP increases led to increases in government health expenditure (Table 6). In general, the income elasticity from the dynamic model was greater than that from the static model and equal for both income groups.

TB prevalence was not associated with government health expenditure in any of the countries income groups, nor did the percentage of the population over 60 years old in the dynamic model have a significant relationship in any countries income groups. In this model, the tax-based dominated system and government health expenditure had a positive significant relationship in upper-middle-income groups.

The poverty gap in the dynamic model had a positive significant relationship in middle-income groups and was negative for upper-middle-income groups.

A larger share of government expenditure in GNP was associated with less government health expenditure in all countries.

Table 5. Dynamic model total health expenditure

Variable	Coefficient	Standard Error	t-Statistic	Probability	Middle-Income	Upper-Middle-Income
LOG(THE(-1))	0.543245	0.068331	7.950215	0	0.543245	0.543245
LOG(GNP)	0.669858	0.19844	3.375622	0.0009	0.669858	0.221521
OOP_THE	0.036202	0.022051	1.641742	0.102	0.036202	-0.006999
LOG(GNP)*INC	-0.448337	0.209572	-2.139297	0.0335		
OOP_THE*INC	-0.043201	0.021444	-2.014639	0.0451		
GGE_GNP*INC	-33.01303	13.73493	-2.403582	0.017		-33.01303
POP_60	-18.97779	4.203652	-4.514595	0	-18.97779	-6.61853
POP_60*INC	12.35926	4.317239	2.86277	0.0046		

Number of observations: 252, cross-sections: 18 periods: 14, Method: panel generalized method of moments, J-statistic 138.0779 Prob (J-statistic) 0.016832

External funds had a negative relationship with government health expenditure in all countries. Homedes and Ugalde (2005) reviewed Latin American neoliberal health reforms sponsored by the IMF and the World Bank and confirmed that neoliberal reforms do not improve the quality of care, equity, and efficiency. This was also found by Kentikelenis et al. (2015), who examined the effects of IMF programs on government expenditure on health in low-income countries. They found that funding programs are associated with higher health expenditure only in Sub-Saharan African low-income countries (LICs), which historically spent less than any other region. This relationship turns negative in LICs in other regions.

DYNAMIC OOP

Similar to government health expenditure, the results showed that GNP increases seems to lead to increases in OOP (Table 7), but only by 50%.

External funds had a negative relationship with OOP expenditure in upper-middle-income countries.

In this model, TB prevalence was not associated with OOP in general. The population over 60 years old was negatively associated with OOP in all countries, but with greater magnitude in the middle-income group, maybe because the Latin American population is aging prematurely, and this process is taking place in the midst of fragile economies and rising poverty levels Pallonia et al. (2002).

SHORT AND LONG-RUN DYNAMICS

The methodology for this part of the chapter was described previously, so the results are analyzed and explained here, and applied to only two variables: THE and GNP.

The visual inspection of both variables, THE and GNP, shows impressively similar behavior that, like many other economic variables, exhibit strong comovements. Moreover, the Granger causality test on the variables under consideration rejects the hypothesis that GNP does not Granger-cause THE (Table 8). This seems to support the view that GDP is actually driving THE.

Table 6. Dynamic model government health expenditure

Variable	Coefficient	Standard. Error	t-Statistic	Probability	Middle-Income	Upper-Middle-Income
LOG(GOVHE(-1))	0.471775	0.070977	6.646893	0	0.471775	0.471775
LOG(GNP)	1.100352	0.249331	4.413213	0	1.100352	1.100352
POVERTY	0.012719	0.003731	3.408962	0.0008	0.012719	-0.00046
POVERTY*INC	-0.013179	0.006935	-1.900355	0.0586		
EXT	-0.003792	0.002242	-1.691238	0.0921	-0.003792	-0.003792
GGE_GNP	-0.651291	0.238236	-2.73381	0.0067	-0.651291	-0.651291
D2*INC	0.088757	0.050951	1.74203	0.0828		0.088757

Number of observations: 252, cross-sections: 16 periods: 14, Method: panel generalized method of moments, J-statistic 86.115 Prob(J-statistic) 0.898

Table 7. Dynamic model OOP

Variable	Coefficient	Standard Error	t-Statistic	Probability	Middle-Income	Upper-Middle-Income
LOG(OOP(-1))	0.47321	0.15479	3.057112	0.0025	0.47321	0.47321
LOG(GNP)	0.560608	0.251278	2.231025	0.0266	0.560608	0.560608
POP_60	-26.55517	14.24144	-1.864641	0.0635	-26.55517	-4.04721
POP_60*INC	22.50796	8.783317	2.562581	0.011		
EXT*INC	-0.007679	0.002586	-2.969593	0.0033		-0.007679

Number of observations: 252, cross-sections: 16 periods: 14, Method: panel generalized method of moments, J-statistic 138.28 Prob(J-statistic) 0.0163

Table 8. Pairwise Granger causality tests

Null Hypothesis	Obs	F-Statistic	Probability
GNP does not Granger-cause THE	252	23.1617	6.00E-10
THE does not Granger-cause GNP	-	0.45097	0.6375

The Pedroni (1999, 2004) test for computing panel cointegration tests shows the results of the test (Table 9). It indicates that the null hypothesis of no cointegration is rejected in four out of seven cases at the 5% and 10% levels. Thus, it is likely that the three variables are cointegrated.

This part of the chapter employs the two-step approach of Engle-Granger (1987), applicable to panel data and based on the estimated residuals models, as the methodology assumes *a priori* that there is one cointegrating vector in the model:

1. We first performed a fully modified ordinary least square (FMOLS) regression for each country, taking care that the residuals were stationary and that the hypothesis of non-normal was rejected;
2. With the residuals of step one, we applied a dynamic panel data model, that is, GMM Arellano-Bond.

Table 9. Pedroni residual cointegration test series THE GNP

Alternative Hypothesis: Common AR Coefs. (Within-Dimension)		
Statistic		**Probability**
Panel v-Statistic	0.934575	0.175
Panel rho-Statistic	-0.073392	0.4707
Panel PP-Statistic	-1.528006	0.0633
Panel ADF-Statistic	-2.04672	0.0203
Alternative Hypothesis: Individual AR Coefs. (Between-Dimension)		
Statistic		**Probability**
Group rho-Statistic	1.241826	0.8928
Group PP-Statistic	-2.604068	0.0046
Group ADF-Statistic	-4.309379	0

Table 10. Long-run elasticities

FMOLS Estimators and Standard Errors		
Country	**GNP**	**Standard Error**
	Upper-middle-income	
Argentina	0.983173	0.064421
Brazil	1.515387	0.044086
Chile	1.018483	0.120481
Colombia	0.826909	0.153212
Costa Rica	1.697272	0.076476
Ecuador	1.613774	0.197739
Mexico	1.187345	0.054187
Panama	1.114398	0.075132
Peru	1.303135	0.062205
Dominicana	0.994912	0.07882
Uruguay	0.900986	0.143257
Venezuela	1.126076	0.304274
	Lower-middle-income	
Bolivia	0.832998	0.278836
El Salvador	0.555641	0.10556
Guatemala	2.481778	0.263501
Honduras	1.366735	0.116171
Nicaragua	1.268974	0.128613
Paraguay	0.254162	0.261186

Given that the existence of cointegration was supported above, our next step was to estimate the cointegration equation using the FMOLS approach developed by Pedroni (2001). Table 10 shows the estimation results for upper-middle-income countries' elasticities for upper-middle-income countries are greater than one, meaning that health is a superior good and that health expenditures are a mean concern in those countries. Moreover, all coefficients for GNP are significant at the 5% level. For lower-middle-income countries the elasticity is very variable, from less than one to greater than one because an illness represents higher spending and by contrast, countries only spend on health when there is a significant illness.

To check that the residuals of the calculated panel were stationary, that is, without unit roots, we conducted the test of unit roots. Very small p-values were obtained in statistical IPS, ADF, PP and Levin, and Lin and Chu, < 0.05, so there are no unit roots and residuals are stationary, and therefore the panel integrates.

Models in Table 10 incorporate the long-term effect that would occur if the relationship between GNP and THE were balanced; however, the steady state can be observed very rarely. This is because relationships are not always balanced due to the inability of economic agents to adjust instantly to new information, so it is necessary to analyze the dynamics of adjustment in the short term (Harris & Sollis, 2005).

The error term in the long-run regression is interpreted as the equilibrium error and this is precisely what serves to tie the short-run behavioral variable THE with its long-run value.

Thus, we obtain the error correction model (ECM):

$$\Delta THE = \underset{\left(4.970\right)}{0.8682\Delta GNP} - \underset{\left(-3.734\right)}{0.547\mu_{_{Log-R}}}$$

During non-equilibrium periods, the long-run residuals parameter (-0.547) is nonzero and measures the distance to which the system is far from equilibrium during the time period *t*. Hence, the estimate provides information about the adjustment speed, that is, how THE changes in response to imbalance in the case of (1-.547) = 0.453, and represents a rapid adjustment in the short term, that is, it takes just more than two years for any disequilibrium in health expenditure to adjust to GNP. These results are in accordance with the findings of Carrion-i-Silvestre (2005), who found that these variables can be characterized as stationary processes evolving around a broken trend. Additionally, Lago-Peñasa et al. (2013) showed that if the long-run income elasticity is close to unity, health expenditure is more sensitive to per capita income cyclical movements than to trend movements.

Ashraf et al. (2008) found that the effects of health (as human capital) improvements on income per capita are substantially lower than those that are often quoted by policy-makers, and may not emerge at all for three decades or more after the initial improvement in health. The results suggest that proponents of efforts to improve health in developing countries should rely on humanitarian rather than economic arguments. Baltagi and Moscone (2010) suggested that health care is a necessity rather than a luxury, Salgado-Vega and Zepeda-Mercado (2012) found that life expectancy explains a great part of the relation between the inequality and the accumulation of the human capital, Jalal and Khan (2014) noted that there is improvement in life expectancy along with an increasing GNI per capita and GDP. In low-income regions; however, the rate of improvement is slower when compared to high-income countries, so health expenditure is very important for better human capital.

CONCLUSION

We found in the dynamic model that income elasticity of total health expenditure is greater in lower-middle-income groups than in upper-middle-income countries. Our study showed that the national level of out-of-pocket expenditure (OOP) in absolute terms is not as responsive to national level indicators in the regression as government health expenditure. This is not surprising as the distribution of OOP among households is a much more important factor for health system design.

Increase in government spending does not automatically reduce the total amount of OPP in all countries except in upper-middle-income groups, but only by an amount of 10%, that is, a dollar spent by government on health reduces 10 cents of OOP. This is particularly true in countries where government health spending is low, as is the case for middle-income countries. Our results suggested that government health expenditure responded to fiscal space negatively with the same effect among all countries, but was less important in middle-income countries, as shown in the static model.

Our results confirmed the existence of fungibility, but the substitution was much less than dollar-to-dollar replacement. Hence, overall spending on health decreases with higher external assistance. Our

results also showed that the increase in external aid on health decreased the OOP in all countries. In this matter there is a controversy, although Lu et al (2010) show that crowding out is a real and widespread occurrence, but Ooms et al (2010) said it does not happen in all countries for which international aid for health increases.

Given the same level of economic development, a country does not necessarily spend more on health when prepayment is the dominant funding source; however, we discovered that OOP as a percentage of GNP is positive and greater in lower-middle income groups and negative in upper-middle countries. Similarly, whether a system adopts a tax-based or insurance-based scheme made no difference to its total health expenditure. Indeed the two systems coexist in most countries.

From this study we found a general increase in health expenditure during the period of 1995–2010 as shown by a 6% annual increase in total health expenditure for middle-income countries and a stagnation of -0.33% for upper-middle-income groups. The same result occurred for government health expenditure rising annually in middle-income groups and decreasing in upper-middle-income groups.

However, external funding showed a negative impact in all countries for government health expenditure and in OOP, so external funds acted as a substitute rather than a complement for these expenses.

Results from this study are consistent with previous studies, which showed that when GNP increased, health expenditure in general increased. The results in all models and for all countries for total health expenditure, government health expenditure, and OOP are simply driven by economic growth. We also found that total government expenditure as a share of GNP had a negative association with government health expenditure, meaning that in Latin American countries health expenditure by governments does not increase as general government expenditure increases due to a competition whit other government priorities. Regarding external funds for health, our study confirmed the conclusion from previous studies that health-specific aid reduced total government spending on health and OOP, and is not important in total health expenditure.

In an in-depth analysis, our results showed the income elasticity for total health expenditure was the same for all countries, but still not greater than one. In the static models, the income elasticity ranged from 0.981 to 0.622. In the dynamic model, income elasticity in all countries showed more variation and ranged from 1.10 to 0.221. The differences in elasticity between middle-income and upper-middle-income countries were found only in the dynamic model of total health expenditure, where it was greater for middle-income groups (0.669) and for upper-middle-income groups (0.221).

However, more generally, the income elasticities from this study are considerably lower than estimates from earlier cross-section studies and we found no evidence supporting the premise that health is a luxury good. One possible explanation may be similar to the argument put forward by Friedman (1957) in his study on the theory of consumption function and the permanent income hypothesis. His argument made a distinction between permanent income and transitory income. These two types of income become distinguishable with time series and panel data models, while they mix up in cross-section studies. The result was similar to an error-in-variable model, which may induce a bias in the cross-section estimate of regression parameters. A similar interpretation was suggested by Søgaard (2000) in the context of health expenditure models. In this interpretation, which was highly speculative, as the author himself admits, the cross-section income elasticity consisted of two factors that combine in cross-section studies, while they become distinguishable with panel data. Additionally, it should be noted that in determining the income elasticity of health expenditure, the identification of non-income determinants are essential for avoiding the missing variable effect. This identification may be difficult for a number of reasons, notably the limited availability of health care data at the macro as well as the micro level. The missing

variable effect would induce either a downward or upward bias depending on the sign of the correlation between the explanatory variables and the omitted variables.

A cross-country study for African countries found that a population over 65 years old had no impact on total health expenditure. Our study also did not find a consistent relationship between aging and health expenditure.

Regarding health system characteristics, there was limited evidence of differences in expenditure being associated with tax-based systems and social health insurance-based systems. Our study found some evidence for the middle-income countries that an increase in government expenditure is due to an increase in the tax-based system and that the social security system diminishing the OOP was consistent with the two previous studies on OECD and Chinese Economic Area (CEA) countries.

The poverty gap in the dynamic model for government health expenditure had a positive significant relationship in middle-income groups and was negative for upper-middle-income groups, so as a country has more of its population living in poverty, it has to spend more on health.

THE changes in the short run due to a movement in GNP and breaks the stationary equilibrium, but short-run behavior quickly adjusts to long-run GNP, so in Latin American countries these variables represent a stationary processes evolving around a broken trend.

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KEY TERMS AND DEFINITIONS

GNP Gross National Product: Or GNI Gross national Income, It is an economic statistic that includes GDP plus any income earned by residents from overseas investments, minus income earned within the domestic economy by overseas residents. GNP is a measure of a country´s economic performance, or what its citizens produced and whether they produced these products within its borders.

Fungibility: Or crowding out, represents the characteristic of a good, asset or commodity that is interchangeable with other individual goods, assets or commodities of the same kind. In our case, for every dollar of international health aid provided to governments, government health funding falls.

Insurance Based Financing: Financing health services through an insurance that can be paid by the government or the individuals by its own income, taking into account that the insurance is the transfer of the risk of a loss, from one entity to another in exchange for payment. This entails medical and surgical expenses that are incurred by the insured, can either reimburse the insured for expenses incurred from illness or injury or pay the care provider directly.

Long Run: The long run is the period of time in which all the factors of production and costs are variable. In microeconomics, there are no fixed factors of production, so that there are no constraints preventing changing the output level by changing the capital stock or by entering or leaving an industry. In macroeconomics is the period when the general price level, contractual wage rates, and expectations adjust fully to the state of the economy.

Out of Pocket Health Expenditures: An expense in health incurred and paid for an individual by it´s personal income.

Per Capita: Means the "average per person" in economics and statistical studies. Is used to indicate a country or region´s income level or economic output.

Short Run: In the short run some factors of production are variable and others are fixed within a certain period of time, but at least one input is fixed, limiting the entry or exit from an industry.

Tax Based Financing: Recent innovation in health care financing for paying health services out of government tax revenues.

Total Health Expenditures: The total amount made by the government and/or individuals in health services.

Wagner's Law: Wagner's law investigates whether there is a long run relationship between government expenditures and the gross national product of a country., in the latter part of the nineteenth century, Wagner (1883) observed that there exists a relationship between economic growth and public spending later formulated as 'Wagner's Law of Increasing State Activities'. The fundamental idea behind this relationship is that the growth in public expenditure is a natural consequence of economic growth. In other words, the percentage share of public expenditure increases with an increase in gross domestic product. That is, the growth elasticity of public expenditure is greater than one.

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Chapter 17
Bridging the Gaps With Nonprofits:
The Intersection of Institutions, Interests, and the Health Policy Process

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ABSTRACT

This chapter will examine how nonprofits are both bridging the gaps left behind from health policy, and are at the intersection of institutions, interests, and the policy process. Using cultural competency as a theoretical lens, the chapter will make use of the current literature, demographic trends, and other qualitative and quantitative data to situate three case studies. As the Affordable Care Act, and other health policies tout themselves as solutions to gaps in health care services for minorities, this chapter offers an overview and evaluation of these policies as well as an explanation of the role nonprofits have in filling necessary service delivery and advocacy.

INTRODUCTION

In 2010, President Barack Obama signed the Affordable Care Act into law with the stated goal of "ensuring all Americans have access to quality, affordable health care" (Affordable Care Act, 2010). Indeed, the pulse of American health care was not good. The law, which helps more people attain health insurance coverage, and prevents insurance companies from denying those with preexisting conditions, still contains gaps that minorities, who are most vulnerable, fall through. It is a well-documented fact that those with lower socioeconomic status; ethnic, racial and other minorities are often those at the highest risk for developing non-communicable diseases (Cesare et al., 2013). Even when all other variables are held constant (insurance, status, income, socioeconomic status, etc.) racial minorities are still "less likely to be given appropriate cardiac medications or to undergo bypass surgery, and are less likely to receive kidney dialysis or transplants. By contrast, they are more likely to receive less desirable procedures, such

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as lower limb amputations for diabetes and other conditions" (Smedley, Stith, & Nelson, 2003). This gap in healthcare for racial and ethnic minorities does not just pertain to more technical procedures – it is also found in more common procedures.

The gaps that exist are neither limited to any particular minority group, nor are they limited to any type of care. There are other health disparities that exist, for a sample, consider the Minnesota Department of Health and Human Services (DHS), who conducted a survey to measure the gaps that exist just in their long-term care facilities. The state found that there was a lack of adequate affordable housing, lack of universally designed houses and/or apartments, and a lack of beds for those with dementia. Moreover, when looking through the lens of cultural competency, those surveyed felt they were unprepared to handle the United States' changing demographics; for example, immigrant needs and the needs of those in the Lesbian, Gay, Bisexual, and Transgender (LGBT community) to name a few (Myott, 2010).

The role of nonprofits then is mission critical to providing quality culturally competent service delivery, advocating for health policy changes. The need for nonprofits has been recognized and nonprofits have responded, in fact healthcare represents 57% of nonprofit workers and the sector has shown tremendous growth despite the recession (Lambert, 2013). In terms of providing service delivery, quality nonprofits can be a cost effective alternative to state run institutions. Indeed many states, including Connecticut, have called for expanding the use of nonprofits in order to help lower costs (Commission on Nonprofit Health and Human Services, 2011). Moreover, nonprofits can serve more niche-based consumers such as those with Multiple Sclerosis (MS). The National Multiple Sclerosis Society (NMSS) helps provide education on the disease, and can help offset the cost of medications, and provide other valuable services to both the person with MS and their support system (National Multiple Sclerosis Society, 2014). Additionally, nonprofits, such as the NMSS, organize supporters, to help provide the political clout needed to make real policy changes. Lastly, nonprofits can also act as patient advocates, ensuring that patients are able to achieve culturally competent health care services – by providing translators, or even helping to get patients to the clinic.

This chapter will analyze where current policies are falling short, where nonprofits are able to step in, and how nonprofits can help drive policy changes. While there is a clear need for nonprofits, there are already nonprofits that are beginning to tackle this challenge. If we are to learn from the precedent of these nonprofits and utilize the aspects that are working, it is necessary to examine some nonprofits that are successful in providing quality, competent service delivery, as well as advocacy.

As the Affordable Care Act, and other health policies tout themselves as solutions to gaps in health care services for minorities, this chapter offers an overview of the role nonprofits should have in filling necessary service delivery and advocacy.

BACKGROUND

In order to understand the role that nonprofits can play in filling the gaps left behind by the Affordable Care Act (ACA), it is important to know the following: how do we understand health care in America, what is the nature of the gaps in health care, who are the key players / process, and what are nonprofits? Answering these questions provides the foundation needed to discuss the issues, controversies and problems more fully.

How Do We Understand Health Care in America?

Public health and health policy experts have been trying to quantify, qualify, and rate health care systems for many years. Generally speaking, there are a few ways one can tackle this task. First, a country can be ranked on how much money is spent on health care as a proportion of its gross domestic product. The Organisation for Economic and Cooperative Development (OECD)'s *Health at a Glance*, report from 2013 shows that the United States ranks first in this category, at 17.7 percent.

While measuring health as an expenditure of GDP is helpful in understanding how much a country is spending on medical care, it is not useful in determining the quality of health care received for the amount of money spent (table 1). Fortunately, the World Health Organization (WHO) performed a study to more accurately measure the performance of health systems. The WHO's assessment and ranking of health systems was based upon the following four criteria: overall health regarding level attained and distribution, responsiveness of the health system, efficiency, and quality. The study measures the level of health care, responsiveness, and efficiency against the overall expenditures on health care. For more information regarding the methodology of the study, please refer to the WHO's report: *Measuring Overall Health System Performance for 191 Countries*.

The report may look familiar to those who have studied public health or health policy, as it is one of the more commonly cited studies, especially because it transformed the way Americans view their own health care. Even though the United States spends the most on health care as a percentage of GDP, and indeed, per capita, they rank at 37th out of 191 countries on the WHO's rating scale. Ranking in first was France, followed by Italy, and San Marino. Germany came in at 25. The United States, however, came in just behind Costa Rica, and just before Cuba (Tandon, A et al., 2000)

Some may argue that the ranking system devised by the World Health Organization is unfair, in that it does not consider how the people of a country feel about their access to health care, and treatment. Indeed, measuring a patient's overall satisfaction regarding health care can be incredibly useful in terms of determining how well a country is doing at providing care. Considering that the United States and its capitalist ethos places much weight in consumer satisfaction, it does seem logical to compare patient satisfaction, which is precisely what the Harvard School of Public Health did in its 2001 study "The Public Versus the World Health Organization" (Blendon, 2001). In this examination, the Harvard School of Public Health relied on national opinion surveys to help illuminate the perception of patients in fifteen European countries, the United States and Canada. In this ranking, the United States fared somewhat better, but not much. Ranking the highest were the Danes, where 91 percent of Danes said they were

Table 1. Health expenditure as a percentage of GDP, 2011

United States	17.7
Netherlands	11.9
France	11.6
Germany	11.3
Canada	11.2
Switzerland	11.0
Denmark	10.9

"very" or "fairly" satisfied with their health care. Finland came in at 81 percent, France at 65 percent, and only 40 percent of Americans stated that they were satisfied with their health care (Blendon, 2001).

Indeed, it is clear that the United States health care system is not performing as well as it could. Moreover, reviewing the WHO ranking suggests that the United States does not rank well in terms of equity, distribution of health care, or fairness in financing. It is in these aforementioned categories that the true gaps in health care exist. The nature of these gaps can both help explain why the United States ranks where it does in terms of health care, and can also provide insights into the ways that nonprofits can bridge these gaps.

The Nature of the Gaps

While more specific issues regarding minorities' lack of access to healthcare will be more fully addressed later in the chapter, it is necessary to understand some terminology to discuss the gaps in health care. Additionally, it is necessary to understand the nature of these gaps. There are two important key terms to know when discussing health care and those who are disadvantaged. The first is *equality*, which Patel & Rushefsky define as "treat[ing] people who are in the same situation the same way, or treat[ing] people in different situations differently (p.190)." Put more simply, when a health care system is *equal*, there is no discrimination on the basis of race, sexual orientation, religion, age, etc. Then there is *equity*, which Patel & Rushefsky note adds a social justice aspect to health care. *Equity* can be understood providing what is necessary in order for people to overcome disadvantages. What does this look like in the health care system? Consider Patient A, a forty year old woman who has multiple sclerosis and is having an exacerbation that requires her to travel to Philadelphia to receive an intravenous steroid treatment twice a month. Each treatment takes approximately three hours. She lives in the suburbs of Philadelphia, and has insurance through her employer, and she speaks English. Now consider Patient B, a forty year old Latina woman who lives in a less affluent area of Philadelphia, on the border of the suburbs. She too is experiencing a multiple sclerosis exacerbation and the same intravenous steroid treatment as Patient A. Patient B also has employer based health insurance. She does not speak English, and does not have a car. Equality of health care would suggest that both Patient A and Patient B should receive the treatments they need, and Patient B should not be turned away on the basis of her race. Equity would suggest that Patient B would also need translated materials in order to better understand her condition, prognosis, and health. Patient B would probably also need some sort of transportation to the clinic.

The reality is that there is discrimination in the United States health care system (Berk & Schur 1998). There is discrimination amongst who is able to obtain health insurance, versus who is not. There is also discrimination on the type of insurance a person can receive. Those who work at a larger firm may be able to receive better health insurance than those who do not. Additionally, a person who has a higher income may be able to afford insurance that covers a wider range of procedures (Jecker, 1993; Enthoven, 2003). In terms of insurance coverage, those who are living below the poverty line are often eligible for Medicaid, but those who are living just barely above the poverty line are not able to receive government assistance. In fact, those who are living in poverty, are much more likely to have no insurance (Collins et al. 2004; Hoffman, Carbaugh, & Cook 2004). Those who are younger, minorities, noncitizens, or foreign-born individuals are also likely to be uninsured (Hoffman, Carbaugh, & Cook 2004).

In terms of type of insurance, there is also inequality within the United States health care system. For those who have good insurance plans, receiving treatment and utilizing preventative medicine to reduce the risk of getting sick is easy. For those who are under insured, or on government programs such as

Medicaid, acquiring quality services is often more difficult (Hoffman et al. 2001; Broyles, Narine, & Brandt 2002; Fairbrother et al. 2003; Committee on the Consequences of Uninsurance 2002). Indeed, the problem is compounded for those who are most vulnerable in society, such as children.

Even though in 2012 Medicaid or the Children's Health Insurance Program (CHIP) covered about 44 million children, there are still about 7.2 million children who remain uninsured. Additionally, the difference in terms of quality of treatment between Medicaid and private insurance is stark (Childrens Defense Fund, 2012).

Byrd and Clayton (2003) also note that disparities in health care among low-income and minorities are not a new phenomenon, but rather part of the history of the United States.

Regarding equity, there are several gaps that exist in the United States health care system. The barriers that affect equitable health care are many and varied. There are the obvious factors: lack of health insurance, and cost-sharing provisions. Then there are the factors that are not as easily identified: lack of transportation, lack of childcare, lack of health care providers in a certain region, and language barriers (Stoddard, St. Peter, & Newacheck 1994). Put another way, for many there are competing demands: clothing, food, and shelter may take precedent over health care, especially when income is tight (Long, 2003).

Voters in the United States have come to the consensus that the United States is not providing the best health care for the best value. The most recent presidential candidates have also emphasized the view that the health care system needs to be changed. President Barack Obama has certainly made headway with his signature piece of legislation, the Patient Protection and Affordable Care Act (ACA). While the ACA has attempted to address the equality of health care, namely, trying to expand insurance so that all people have access to health care, the Congressional Budget Office still estimates that 23 million people will still be without health insurance by 2019. The ACA also does not go far enough in ensuring that all persons are treated equally. According to a report by the Associated Press, insurance companies are maneuvering around the ACA. An example is insurance companies changing their policies so as to require those with chronic illness to pay a greater portion of their costs associated with their chronic illness. This amounts to discrimination against those complicated, long-term diseases (Politico, 2014). Additionally, the law does little to help address the bigger problem of equity of health care.

Political Arena

Key Actors

To understand what more can be done, it is necessary to understand the political environment in which this is all occurring. Health care and policy are created, and implemented within a myriad of institutions, and political actors. There is the public sector, which includes, government (local, state, and federal). Next, there is the private sector, which includes health care providers, professionals and purchasers (people needing these services and insurance companies). Often, people forget about the third sector, or nonprofit sector, which includes many of the same actors (purchasers, providers) as the private sector. The third sector will be discussed more at length later in the chapter.

The way in which actors partake in the formulation of policy, can be understood as the policy cycle. This cycle, as described by Baumgartner & Jones, includes agenda setting, policy formulation, budgeting, implementation, evaluation, and modification or termination of policy (2008). Actors participate at each stage of the policy cycle in order to advocate for its own interests – this often results in policy that is messy (Baumgartner, & Jones, 2008; Patel & Rushefsky, 2006).

Institutions

The United States turns to its Constitution to determine the legitimacy of a policy, and indeed, help in formulating policy. The Constitution devised a government with three branches so that not one branch would have too much power. The result of this arrangement was that the Executive, Legislative (composed of a House of Representatives and a Senate), and Judicial branches had a separation of power and a means by which they could check and balance the power of the other branches. The set-up of these somewhat coequal branches of government sharing power leads to a political environment that creates competition. As a result, if there is one party in control of the Executive branch, and a different part in control of the Legislative branch, gridlock may occur. Moreover, the fierce competition for preeminence in policy arenas can make it difficult to formulate consistent, comprehensive policies, especially in the area of health policy (Baumgartner & Jones, 2008). Equally important, policies must hold up to the spirit and values of the United States Constitution, or face the chopping block of the Supreme Court. It is clear then, that the creation of policy in the United States is highly dependent upon the constitutional environment of the health policy process.

The political environment is also focused on the Congress. Congress is the legislative body, in other words, Congress is who produces policy. Congress itself is a highly decentralized body. Several committees and subcommittees exist in both the House of Representatives and the Senate. It is in these committees that questions are asked, solutions are examined, and policies get proposed before being voted on by the chamber as a whole (Oleszek 2014).

If a bill gets through committee and is actually brought to a vote, there are still barriers to passage. Congress is currently experiencing unprecedented polarization in Congress, which makes even more difficult for members to agree on any bill, let alone a bill as controversial as health reform.

Politics

With all the partisanship, and incentives to represent interests, it is certainly difficult to enact any substantial policy changes. There are a few theories as to how policies are actually passed and implemented. The theory of *incrementalism* suggests that policy makers prefer policies that change small aspects of an existing bill instead of comprehensive change. A policymaker may choose these smaller incremental changes as a way to reduce the potential fall out of a negative impact, or other politically risky consequence. The cost of this type of decision-making can be the lack of new or creative ways to solve problems (Rosenbaum, 1985). Consensus or coalition building is often key in incrementalism. The process by which conflicting interests and values come together is tricky. Logrolling (trading votes) is a common tactic, so too is pork-barrel politics (directing government projects to a legislator's home district). These types of coalitions and trades can result in a policy that looks drastically different from its original form.

Herbert Simon, an American political scientist, sums up the theory as "satisficing." In other words, Congress seeks to "satisfy" certain interests with a solution that "suffices," or meets some minimum acceptable level.

Perhaps the most intuitive and certainly the most dramatized political aspect of policy making is the electoral cycle. In this view, policy decisions are calculated based on potential electoral consequences. No doubt, this mentality is especially true around elections. In short, Patel & Rushefsky describe this policymaking process as "drive by the need to produce short-term tangible benefits."

Nonprofits

Lastly, it is important to know a little about what nonprofits are. Nonprofits are exactly that, institutions that do not earn a profit. Nonprofits may, however, have an operating surplus, but the extra earnings are reinvested into the organization in order to support future programs or services. This is uniquely different from the private sector, where profits are dispersed to shareholders. The nonprofit sector is also different from the public sector, that of the government, which is why nonprofits are sometimes referred to as the *third sector*.

In order to better understand the difference between the private sector, the public sector, and the third sector, let us examine the services they provide. The private sector is the marketplace. In the market place, producers create goods and supply them to a consumer, who wants the goods – as long as the consumer can pay the price, they get the good. Indeed, the market regulates prices for services, because the producers who are seeking to make a profit, can only charge as much as a consumer is willing to spend for an item, or risk another competitor providing the good at a lower cost.

According to Sargeant & Sheng (2010), the public sector varies from the private sector in that the public sector provides services that are important to society, but that do not generate enough profit to make it worthwhile for an individual to create and maintain the service. These institutions are provided for and funded by the government.

There are of course those services that do not enjoy popular support and thus taxpayers (who are also voters) are not willing to fund. As a result, only some fundamental human needs can be provided for through the public sector. This creates a gap where there are important human needs that need to be met, but are not being provided for by either the private or public sector. That is where nonprofits step in. Nonprofits operate by collecting money from government institutions (in the form of grants, and in the case of 501(c)3 organizations tax exemptions), corporations, and individuals and then putting that money towards services and programs that are not currently being tended to by either the market or government. For the purposes of this chapter, only 501(c)3 organizations will be considered.

A 501(c)3 is a specific type of tax exempt nonprofit organization. Those nonprofits who designated as 501(c)3 organizations by the Internal Revenue Service (IRS) are often called "charitable organizations" or "public charities." The IRS sets strict rules on organizations that receive tax-exempt status. First, the organization must benefit the public interest, and not private shareholders. Additionally, net earnings must be reinvested into the nonprofit itself, to help provide more programs and services. Lastly, and perhaps most importantly, 501(c)3 organizations are restricted in the amount of legislative activities they participate in (IRS.gov). It is important to remember that 501(c)3s are allowed to participate in advocacy and legislative activities; they *are not* allowed to spend a majority of their time or money focused on this activities. Examples of 501(c3) organizations are: churches, hospitals, colleges & universities (IRS).

In sum, through understanding how the United States health care system is viewed, the nature of the gaps that exist, the environment in which health policy is created, and what nonprofits are, it is possible to delve into the issues, problems, and controversies surrounding health care, and the role that nonprofits have in solving these problems.

BRIDGING THE GAPS

Issues

The goal of the Affordable Care Act (ACA) was to provide quality, affordable health care to all Americans. Even with this new law, there are still many gaps that exist in the current health care system. Moreover, the gaps that exist are affecting the most disadvantaged citizens, minorities. The ACA focuses its efforts on equality of health care, specifically on the issue of insurance. The issue of equity in health care is currently not addressed and is a main reason why the ACA leaves many chasms for the most disadvantaged members of society to fall into.

Let's expand on each of these issues more broadly. First, we will consider some of the gaps that exist, next an examination of what the ACA actually accomplished, followed by the means by which the ACA set out to provide quality affordable health care, and lastly an examination of the principles of equality and equity within the ACA.

Minorities and those in low-income groups generally do not have the same access to health care as their white and/or wealthier counterparts (Byrd and Clayton, 2003). This has been a historical trend in American health care, but it is important to remember that this is not true for every single person who is a minority or living in poverty. Complicating the issue is the fact that in general, minority groups have a host of other disadvantages: lower education level, higher crime rates, and high unemployment rates. Not only can all these factors influence health, it is also likely that these rates have more to do with poverty than they do race (Committee on the Consequences of Uninsurance, 2002).

According to the Bureau of the Census 2004, minorities are more likely to be uninsured than non-minorities. For example, 19.5 percent of African Americans were uninsured as compared to 11.1 percent of non-Hispanic whites. Moreover 18.7 percent of Asians and a staggering 32.7 percent of Hispanics were uninsured in 2003.

In addition to being uninsured, age-adjusted death rates are higher for minorities than whites. The lack of access to health care begins before birth as minorities often have less access to prenatal care (National Center for Health Statistics 2004). Related to prenatal care is the issue of birth weight, and premature birth; according to a 2003 Agency for Health Care Research and Quality study, minorities have higher rates of low-birth weight and premature births. Low birth weight, and premature birth are also risk factors for infant mortality, so it is no surprise that minorities also have higher rates of infant mortality. The same study also shows that access to health care does not improve after birth – minorities are also less likely to receive all their vaccinations. Additionally, the study also found that for minority women, the statistics are even more daunting. For example, the study found that minority women are less likely to screenings (such as pap smears or mammograms), and that minorities with breast cancer are "less likely to receive surgery and more likely to receive no treatment than whites" (Patel & Rushefsky, 2006).

An additional problem for minorities, in particular Blacks, is chronic illness. Unlike their white counterparts, Blacks often go longer without diagnosis and without treatment – this has the obvious consequence of increase mortality rates. Generally speaking, the earlier a person is diagnosed and can start treatment, the more effective that treatment is. More alarming is that even after a treatment has begun, Blacks often receive less aggressive interventions than their white counterparts (U.S. Department of Health and Human Services, 1991).

While the U.S. Department of Health and Human Services "Health Status of Minorities and Low-Income Groups" report may seem out of date, being printed in 1991, but unfortunately, the findings still hold true. Even when all other variables are held constant (insurance status, income, socioeconomic status, etc.) racial minorities are still "less likely to be given appropriate cardiac medications or to undergo bypass surgery, and are less likely to receive kidney dialysis or transplants. By contrast, they are more likely to receive less desirable procedures, such as lower limb amputations for diabetes and other conditions" (Smedley, Stith, & Nelson, 2003).

Indeed, a study as recent as 2013 has also concluded that minorities are still facing barriers to health care and health inequities. According to Cesare, et. al, those of low socioeconomic status, or those who live in impoverished communities "have a higher risk of dying from non-communicable diseases (NCDs) than do more advantaged groups and communities." The authors even suggest ways to combat NCDs in these communities; they include strategies that may seem odd, considering they suggest early childhood development programs (and other improvements to education, as well as employment changes, instead of strictly medical tactics. The authors note that improving education, and removing barriers to secure employment will help begin to remove some of the educational and financial barriers to health care. Moreover, the authors argue for universal insurance to help further reduce these financial burdens.

Given that the ACA seeks to remedy many of these barriers to accessing quality affordable health care, what can be said about President Obama's attempt to solve these problems through the ACA? The Democrats and Congress did make a noble effort to expand health insurance. The logic was that through expanding health insurance, more people would have the access needed to acquire medical services, but what did the ACA really do?

The entire reform is itself some 400,000 words, and to fully explain the law itself would be a book in itself. For the purposes of this chapter, painting with broad strokes will suffice. Put simply, the ACA did three things. First, it expanded health care coverage. It also put some regulations on the insurance companies. Third, it changed taxes in order to provide funding.

In terms of expanding coverage, the Congressional Budget Office (CBO) estimates that about 32 million more people will health insurance of some form or another by 2019. None of this coverage will come from a public option, that is, government insurance program. The pubic option, which was talked about when the administration was pushing health reform, did not make the final bill. Instead, the expansion comes in several ways. Part of the expanded coverage comes from lowering eligibility standards for Medicaid. The main way that Medicaid expansion worked was through making those without children eligible for coverage. Overall, the CBO estimates that some 16 million additional people will be covered through Medicaid.

As an important side note, for the first five years of Medicaid expansion, the federal government will foot the bill. This is different from the usual way Medicaid is paid for, which is a split between the federal government and the state (Reid, 2010).

The new law also plans to increase the number of people with health insurance through insurance exchanges. These exchanges, run by either the state or the federal government, will provide five levels of coverage: "bronze," "silver," "gold," "platinum," and "catastrophic." The various plans are meant to give those in looking for insurance, a choice insurance options to meet their needs (Reid, 2010).

For those who were unable to afford insurance, the exchanges help provide a range of coverage options that may fit a person's budget. If however one is still unable to afford coverage, the government offers tax credits that are meant to help offset the cost of insurance. In addition to setting up exchanges, the ACA also helps provide coverage through employer based insurance programs.

Those companies that have more than forty-nine people on payroll are required to provide an insurance plan to employees. Like those looking to buy insurance, but need help offsetting the costs, the federal government offers tax credits to small employers to help them provide insurance.

In terms of regulating insurance companies, the ACA made it illegal to deny insurance to someone with a preexisting condition. In order to accommodate taking on a higher risk pool, those with preexisting conditions, the ACA required that everyone buy insurance under what is known as the individual mandate. It is no surprise that healthy individuals may not feel the need to purchase insurance, even if it is mandated. There is a penalty for not purchasing insurance, though the penalty may not be enough to dissuade people from dodging the mandate. The penalties ramp up, so the penalty for not having coverage in 2014 is one-percent of yearly household income or $95 per person for the year ($47.50 per child under 18 years of age) – whichever is higher. The penalty in 2015 will be 2% of yearly household income, or $325 per person for the year ($162.50 per child under 18), whichever is higher. In 2016, the cost of the penalty will be 2.5% of income or $695 per person. After 2016, the cost is adjusted for inflation (healthcare.gov).

A portion of the new health care law was designed to fund the law itself. The Congressional Budget Office (CBO) put the cost of the reform at around $940 billion for the first ten years. This is no pocket change, and thus Congress had to create new taxes and fees in order to fund the policy. Some of the ways the ACA is funded are: a new Medicare tax (earning more than $200,000 per year) can except the tax paid on Medicare to be raised to about 3.8 percent. The law also taxes pharmaceutical companies, health insurance companies, and medical device manufacturers. Additionally, the law will be funded through the abovementioned penalties.

From the strategies the ACA employs to bring about this quality, affordable health care, it is clear that Congress was focusing on the issue of *equality* of health care. By changing the way people obtain insurance, and the eligibility requirements for government run programs such as Medicaid, the law sought to give more people the opportunity to receive health care despite the ability to pay for medical care. The notion that everyone should be able to obtain health care regardless of age, gender, income, etc. is the key principle of equality we discussed earlier. The question remains, did the ACA meet this goal? The answer is not so clear.

While the many more people will have health insurance thanks to the new law, the CBO predicted that 23 million Americans would still be uninsured in 2019. Other countries, such as the United States' neighbor to the north, Canada, provide universal coverage to every citizen. Similarly, most other developed countries provide similar equality of coverage (Reid, 2010).

Despite the campaigning of the health reform law taking a social justice tone, the ACA did little to solve the inequities in the health care system. As noted above, minorities and in particular racial minorities, still receive less adequate medical care and treatment than whites. Indeed, Brown et al., Cesare et al., and Gornick et al., noted that insurance is not enough. Gornick et al.: state that race and income have substantial effects on mortality and use of services among Medicare beneficiaries. Providing health insurance is not enough to ensure that the program is equitable for all beneficiaries. This is especially important because Medicare provides universal coverage to all those 65 years or older, so the study can highlight the inequalities and inequities within the health care system by holding type of insurance coverage constant. Additionally, to ensure that there is equal *and* equitable treatment, other barriers besides insurance must be addressed. Areas such as patient and provider communication, health literacy, language barriers, culture, social support, and transportation must be addressed (Brown, Ettner, & Piette, 2004).

CONTROVERSIES

There are several controversies surrounding the ACA in particular, and health reform more broadly. As previously mentioned, there are many key players in health care reform: the insurance industry, the government (state, local, federal), patients, doctors, pharmaceutical manufacturers, and medical device companies, to name a few. Each of these actors has specific, and often competing interests. In order to reconcile these competing interests, logrolling, pork barreling, and satisficing occurs. Accordingly, the ACA went through many iterations before coming to its final form, for example, the proposed public option for insurance was struck out of final version of the ACA.

President Obama's health reform also faced a Congress that was deeply divided. The Democrats in Congress pushed through the reform on sheer will alone. In fact, not one Republican, House or Senate, signed the final copy of the ACA (Devins, 2012). There is also a lack of buy-in from the states – Kaiser Health News notes that there are only 36 states participating in the health exchanges. Additionally, according to Congressional records, the Republicans in Congress have tried to repeal or change the ACA over fifty times. Furthermore, according to the Pew Research Center, Congress is more polarized than ever, and so are the people who elected them.

At the heart of the controversy is a not a battle of whether or not people should receive health care, but rather, it is a battle of ideology. The Democrats believe that government has a responsibility to provide health care for the people, and that government should play a crucial role in helping the American people attain quality, affordable health care. The Republicans, however, believe that while Americans should have access to quality, affordable health care, they often believe that the federal government does not have a role to play.

With both the government and voters becoming ever more polarized, and fundamental disagreements about the role of government in health care reform, the question remains: how do we solve the problems in health care with a plan that brings both sides of the aisle together?

PROBLEMS

The problems in solving health care are tightly tied to the controversies of health reform. No doubt partisan polarization only exacerbated the tensions between the actors in health care policymaking. In addition to the controversies that exist, there are a few other key problems that are causing our health care system to fail. First, health care in the United States is very expensive. As we noted, the United States already spends the most on health care. The cost of medical procedures, hospital stays, and prescription drugs all cost more in the United States than they do in other countries like France or Canada (Reid, 2010). Moreover, doctors in the United States pay more for medical school than their counterparts overseas. So too, U.S. doctors pay more in malpractice insurance.

Then there are the insurance companies. Insurance companies in the United States are generally for-profit companies, that is, they exist to make money. Reid, 2010 points out that the language health insurance companies use highlights the mentality of the industry: "the money paid to doctors, hospitals, and pharmacies for treatment of insured patients is referred to as a 'medical loss'" (p.37). The insurance companies see paying for treatments as cutting into the overall profit of the company. No other developed country views insurance and payment for services in this way.

While the ACA does cap administrative costs for private insurers at around 15 to 20 percent, it is still high when compared to British and Canadian insurance companies who only spend about five percent on administrative costs (Reid, 2010). United State health insurance companies may also deny claims, which is no doubt helpful for insurance companies looking to make a profit. While the ACA does make changes, both denying coverage for preexisting conditions, and the practice of rescission, and putting caps on payments, are no longer allowed, insurance companies are still allowed to deny claims. Lastly, the United States still links insurance to employment, so if a person loses her job, she loses her coverage.

Another problem for health insurance companies, and the heath care system in general is that there are still barriers for minorities. Even with the ACA, a lack of cultural competency pervades the American health care system (Caccioppoli, 2014). Without insurance companies and health care providers addressing issues of culture, the United States will continue to provide services that are unequal and inequitable.

SOLUTIONS AND RECOMMENDATIONS

The potential solution to the United States' health care ailments must be one that is founded on the principles of equality *and* equity. As the literature has shown, equality without equity maintains the current gaps in the health care system while giving the illusion of a more just health care system. Next, the solution must acknowledge the key actors and engage in the policymaking process. Lastly, the solution must acknowledge the tumultuous state of American politics.

While it would be very bold indeed to say that this chapter has *the* solution, there is reason to believe that nonprofits will be a critical element in the solution.

A key component to solving these problems is the use of nonprofits, specifically, 501(c)3s. It may seem strange, however nonprofits have the potential to address equality of health care, issues of equity, and engage in all levels of policymaking and implementation. Furthermore, nonprofits are able to skirt around much of the controversy, making them more likely to be embraced by both Democrats and Republicans.

To begin, nonprofits have been a fabric of the American identity and an alternative to government since the nation's founding. French political philosopher Alexis de Toucqueville noted the importance of associations (which are nonprofits), during his visit to America in the 1830s:

Americans of all ages, all conditions, and all dispositions constantly form associations. They have not only commercial and manufacturing companies, in which all take part, but associations of a thousand other kinds, religious, moral serious, futile, general or restricted, enormous or diminutive. The Americans make associations to give entertainments, to found seminaries, to build inns, to construct churches, to diffuse books, to send missionaries to the antipodes; in this manner they found hospitals, prisons, and schools. If it is proposed to inculcate some truth or foster some feeling by the encouragement of a great example, they form a society. Wherever at the head of some new undertaking you see the government in France, or a man of rank in England, in the United States you will be sure to find an association. (Tocqueville, [1835] 1945, II p.106)

In his travels through the new, young republic of the United States in the 1830s, Tocqueville found that associations, or nonprofits, were responsible for stepping in where the government or private interests did not. All members of the society utilized associations of one form or another, and indeed care for people with disabilities, education, and healing were provided for through these associations.

Politics and Cost

Regarding partisan polarization, both Democrats and Republicans can get behind the use of nonprofits. For Democrats, the key issue is providing quality, affordable health care. Many Democrats feel that the private sector is unable to bring costs down to a level where all persons are able to participate in the health care system. Nonprofit organizations have the potential to drastically reduce costs because the emphasis is not on making profits. For Republicans, there is no sacrificing of principles. Rather than government stepping in to ensure health care, nonprofits will assume the role, which means there is no threat of government encroachment. Some more conservative individuals may try to argue that nonprofits will kill the market element, which is another fundamental value of republicans. This is simply not true. When examining other developed countries that utilize nonprofits as a cost effective measure, such as Germany, insurance companies are private nonprofit agencies (Reid, 2010). These nonprofit agencies are still able to compete for customers, by offering additional services, or selling supplemental insurance packages etc. Additionally, it does not mean that there are not some health care professionals that operate for-profit businesses. While the market may look different, there are still the common principles and elements that will remain unchanged even with the implementation of nonprofits.

Furthermore, the United States already attempted to utilize the private sector to help reduce health care costs. The managed care revolution, private sectors competing for government contracts, and H.M.O.s, did not end up reducing overall health care costs (Berenson, 2008). It is also true that other countries have had success in utilizing nonprofits to help manage costs and provide more equitable access to health care services. Whether looking at Canada, Germany, France, or Britain – or looking East to Japan, one thing is clear, these countries are spending less money and providing better quality health care to more of its citizens; and the care is distributed more justly (OECD; WHO; Reid, 2010). In fact, some states have already seen that nonprofits can be a viable solution to improving health care. A 2011 bipartisan report from the Connecticut Commission on Nonprofit Health and Human Services has recommended and advocated for the use of nonprofits to help reduce health care costs and to better provide for Connecticut's most vulnerable populations. The report also notes that nonprofits are also better than the government at providing these services, which are not provided for by the private.

Equity

What about the issue of equity?

Earlier, it was noted that one of the biggest inequities in the United States' health system is the lack of physicians and health care services in low-income communities. The main reason for this was that it is not necessarily the most profitable for physicians to accept Medicaid, or to serve in less affluent areas. The result is that the most vulnerable members of society, even with insurance, often go without necessary health care and treatments. Unlike for-profit ventures, nonprofits do not look to make profits to pass on to shareholders. Nonprofits can utilize fee-for-service methods to both sustain themselves, and attempt to build extra earnings that can be utilized to help offset the costs for those who cannot pay.

Moreover, nonprofits have the potential to provide unique culturally competent health care services to specific populations. The rollout of the ACA notably failed at engaging one of the fastest growing demographics in the United States, the Latino community (Caccioppoli, 2014). Without a culturally competent campaign to get Latinos health insurance coverage, the federal government missed a huge opportunity to provide health insurance to a group that might otherwise not be able to afford coverage.

As previously mentioned, there is clear racial and ethnic discrimination going on in the American health care system, such as minorities receiving less adequate, or aggressive treatments for the same ailments as whites. Culturally competent care is critical if equitable care is to be provided.

Culturally competent care, and equitable treatment does not necessarily need to take place at the hospital or insurance level, although, they certainly should. Nonprofits can also occupy a specific niche. Consider the National Multiple Sclerosis Society (NMSS), a nonprofit dedicated to eliminating multiple sclerosis, through research and advocacy. The NMSS also works to provide services for all those affected by multiple sclerosis, including family members, caregivers, etc. The NMSS and organizations like it provide a valuable alternative resource for health care users. The NMSS helps provide services like funding for research. It also unites those affected by multiple sclerosis – leading to innovative solutions such as members of the society donating their old walkers or wheelchairs (that they can no longer use due to progression of the disease, or the death of a loved one), so that a person who could not afford the item will still have access to a necessary assistive device.

Surplus is only one aspect of calculating the performance of a nonprofit, they also consider fulfillment of their mission statement. As a result, a nonprofit with a mission to provide quality health care to low-income African American women in Northeast Philadelphia, may have more of an incentive to create a transport service that helps women get to and from appointments. Since any surplus earned by the nonprofit has to be reinvested into the organization, nonprofits also have the opportunity to expand and improve upon existing programs.

Perhaps most importantly, nonprofits (especially high impact nonprofits) also engage in advocacy. Crutchfield and Grant, note in their updated 2012 book, *Forces for Good*, that nonprofits mobilize members and provide the political clout needed to make real social changes, particularly through advocacy. The more nonprofits advocate, the better they can serve. The authors go on to note that if nonprofits are to be successful in both their advocacy and service delivery, they must act in ways that are bipartisan, as that is the only way they will gain the necessary support for their endeavors. The ability for nonprofits to advocate means that the constituents they serve will be well represented in Congress. Moreover, it means that all people including the most vulnerable will have a seat at the policymaking table. For racial minorities, or those with chronic illness, having a seat at the table will mean that policies will be designed with their needs in mind – and overtime, more culturally competent service delivery will provided.

FUTURE RESEARCH DIRECTIONS

Research on minorities and healthcare typically focuses on the problems, not the solutions. Likewise, most of the research regarding health care reform focuses on the failings of the private and public sector, and not on the potential of the third sector. Public health and epidemiological studies have repeatedly shown that addressing issues of equity, such as health literacy, education, transportation, etc. has a real impact on the overall health of a community. Knowing that nonprofits have already begun to address these issues indicates that increased support and partnership with local or state governments can provide insights into the ways in which nonprofits can truly improve American health care. Until more nonprofits begin to collaborate with state and local governments, it will be necessary to explore the way other countries utilize nonprofits.

CONCLUSION

The United States health care system is currently facing many ailments. From skyrocketing costs, to a lack of return on the spending, the health care system is in crisis. The Patient Protection and Affordable Care Act, President Obama's signature legislation, begins to address some of the issues of equality in the health care system, but does not provide the truly comprehensive health reform it touted. For minorities, access to quality, affordable healthcare is still difficult. Doctors often have a small presence, if any, in low-income neighborhoods. Women, and racial minorities face discrimination in the system even with health insurance; for those without coverage, the situation is even worse. To complicate matters, the political environment in which healthcare policy is made is complicated to say the least. With numerous actors and interests, creating and passing comprehensive health care reform is difficult. Furthermore, partisan polarization in the United States Congress is at an all time high. With representatives and senators voting along their party's ideological lines, only a truly bipartisan solution will survive.

Nonprofits have the potential to be this solution. Unlike the private sector, which failed at its chance to improve health care, the nonprofit sector does not seek to fill the pockets of shareholders. This allows nonprofits to focus on providing quality care and fulfilling its mission. Unlike the private sector, nonprofits have no incentive to deny claims, or discriminate against those insured. Moreover, nonprofits are able to perform these services at significantly lower costs than the private sector – as evidenced by other countries, and innovative solutions from the state of Connecticut.

In addition to reducing overall health costs and providing a more equal health care system, nonprofits have the potential to address the issue of equity. Nonprofits use surplus money to expand programs, and experiment with new ways to provide better services to their constituents. Furthermore, nonprofits mobilize their constituents to help them engage in the policymaking process.

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KEY TERMS AND DEFINITIONS

Advocacy: The process by which a group of people acts and engages the political process to create change.

Affordable Care Act: President Barack Obama's signature health care law, signed in 2010 and sought to provide Americans with quality, affordable health care.

Communicable: To be transmitted from one to another, especially regarding disease.

Cultural Competency: A theory and practice that focuses on addressing, acknowledging, and appreciating cultural diversity.

Equality: The act of treating people the same.

Equity: Related to equality but adds the social justice element of providing those with disadvantages the opportunities needed to overcome those disadvantages.

Nonprofit: An Internal Revenue Service designation for an organization that does not seek profit, but rather, reinvests earnings back into the organization.

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Chapter 18
From the Margins to the Mainstream:
Clinical Costing for Clinical Improvement

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ABSTRACT

Healthcare system performance needs information on cost and revenue of care because of the rising healthcare costs. Empowering clinicians with clinical costing information is central to the success of containing costs. This information holds clinical data linkage unifying clinical, financial and administrative datasets, and seems to facilitate the spending of scarce health care resources in a way that produces the biggest difference in clinical outcomes. This chapter looks at the methodology and processes of clinical costing and its potential applications to facilitate the delivery of value-based healthcare, which confers quality care at lowest unit cost. Policy implications would be purchasing value-based healthcare, based mostly on quality of care after removing avoidable costs for inefficiency and poor quality. Clinician participation in the clinical costing is the key to success, because clinicians will be informed of the options available to choose the most value-based healthcare, which will, in turn, take care of the tight healthcare budget. Yet, this method of clinical costing is still at the margins.

INTRODUCTION

A Melbourne physician has asked a sensible question in a recent newspaper article: "How can we save on healthcare costs if doctors are kept in the dark?", because she finds it hard to answer a very simple question from one of her patients on discharge: "Doc, how much did my care cost?" She concludes that educating those who are on the frontline of healthcare about the true cost of the care they offer could make for a more informed profession (Srivastava, 2014). She advocates for the empowering of the doctors on communicating the deeply sensitive issue of cost to patients at all stages of illness, and about the meaning and cost of interventions at the end of life. Fortunately, the clinical costing information

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system can answer not only this type of question fairly easily and accurately on her behalf, but also a more complex question such as "Is the healthcare system lean and mean?"

There is much empirical research into the costing of clinical practice, but to a great extent this focuses on the specific disease or a practice in a specific clinical setting and overlooks the clinical costing in general. Researchers seem to be reticent to do thorough research on the clinical costing sector, and only a few papers have been written for clinical communities to understand what clinical costing is.

THE OBJECTIVES OF THE PAPER

This paper is aiming to fill the gap of research on the clinical costing sector, its history, methodology and processes, and its potential application for studying the association between value-based care to the individual patient and to society as a whole with real world examples. This research does not just stop at an inquiry about the issues but also moves a step further, and explores possible actions, particularly in favour of a clinically-driven approach based on public health concepts to distribute limited healthcare resources.

BACKGROUND

The rising cost of health care is attracting a great deal of attention with the upsurge of interest in clinical costing on the release of a recent report indicating that healthcare spending alone will exceed all revenue collected by the Australian states and local governments in 2045 (The Australian Government, 2011). Health care costs will continue to rise in every country. Possible reasons for rising health care costs are aging populations and costly new treatments. Insurance companies and governments reimburse for health care performed (for example, activity-based funding) rather than clinical outcomes achieved (outcome-based funding) (Duckett, Breadon, Weidmann, & Nicola, 2014; Kaplan & Porter, 2011). This type of healthcare funding gives rise to a situation where only a few patients take direct responsibility for the cost of their healthcare (Kaplan & Porter, 2011), because only a few people acknowledge a more fundamental source of cost information: clinical costing systems by which healthcare costs are measured.

The biggest problem of rising healthcare costs seems to be that costs are measured in the wrong way and clinical costing information is interpreted wrongly (Kaplan & Porter, 2011). Some poor clinical costing systems allocate costs to services based on reimbursements using inaccurate allocation rules rather than actual resource utilisations. Since costs are wrongly measured clinical improvements and sustainable cost reduction are impossible. Healthcare services usually turn to simplistic actions such as across-the-board budget cuts in expensive but necessary services, and head counts. As Kaplan and Porter (2011) point out, the results of these arbitrary budget cuts on discrete components of care are higher system costs and poorer clinical outcomes later. All health care professionals could try to understand the cost of their services and how these costs compare with clinical outcomes.

Clinical costing seems to be under-researched and under-published. For example, only 36 papers were found in the PubMed database with the criteria of "clinical costing", "last 5 years" and "English"; and almost all of them were related to the application side of clinical costing. Therefore, this paper will discuss what clinical costing is, who generates the costing data and how this information could be used, based on three bodies of literature: health economics, public health research and accounting.

MAIN FOCUS OF THE CHAPTER

What is Clinical Costing?

It is a discipline which studies the cost of resources used to deliver patient care (Department of Health Victoria, 2013). Clinical costers are specialists responsible for end-to-end clinical costing data management (it is a working definition of clinical costers for this chapter).

Clinical costing in Australia started in the 1980s with two major clinical costing systems: Transition and Trendstar (The Clinical Costing Standards Association of Australia, 2012). Clinical costing is used as a tool to identify areas of healthcare management concerns within a casemix funding environment. Internal cost reports are developed to accommodate internal organisation structures. A standardised costing methodology, such as Clinical Costing Standards, was introduced to compare and benchmark among hospitals for the purpose of improving clinical care. Clinical costing emphasises the effectiveness of care through the review of clinical processes and the implementation of continuous improvement. Several costing software vendors have entered this sector to facilitate computerised clinical costing, such as PowerHealth Solutions and CostPro.

Clinical costing information is mainly used for developing a national efficient price (NEP) of activity-based funding (ABF) in Australia and therefore, Victorian public hospitals are required to report healthcare costs for all operational funded activities (Department of Health Victoria, 2013).

The Methodology

The activity-based costing (ABC) method is widely used to process an episode-level patient cost in Victorian hospitals (Cooper & Kaplan, 1988). The method allocates costs directly to individual patient episodes using various cost drivers such as transaction, duration and intensity cost drivers (for example, theatre duration) and thus minimises assumptions in allocation, thereby achieving accurate costs. This method of allocating costs is called "bottom-up costing" (Chapko et al., 2009). Another method called "cost modelling" (a top-down approach) allocates costs to patient episodes using formulae and assumptions in the absence of service volumes. Both methods provide an estimate of patient costs. The costing methodology of all metropolitan and major rural health services in Victoria is required to follow the Australian Hospital Patient Costing Standards (Australian Government, 2011). A brief description of the clinical costing process is included in the next section.

A Fully Allocated General Ledger

An up-to-date full general ledger (GL) is extracted and loaded into a healthcare-specific clinical costing software and data base for a relevant costing period. Once the general ledger data are loaded into the system, direct patient care cost areas are created to combine cost centres which hold expenses and revenues for their similar patient care. The remaining cost centres which do not provide direct patient care are designated as "overhead areas" and their expenses are distributed to the direct patient care area based on the resource utilisation weight of the destination patient care areas; for example, the head count of the ward is an allocation basis for spreading the costs of the Payroll overhead area. The result at this

stage is an accumulation of expenses to be allocated down to the individual services, such as chest x-ray or an operation. This stage is called the "fully allocated general ledger". In the costing world, it is said that clinical costing starts with the GL on the financial side.

Patient Care Activities

Patient care activities include outpatient clinics, operations, surgeries and inpatient ward round. Services or intermediate products include radiology, drugs and pathology tests. These activity files are extracted and defined for counting measures (such as theatre minutes), loaded into the software, and relevant services are created; such as blood tests, chest x-ray and ward rounds. These individual services are then linked to relevant patient encounters based on a linking rule in the costing engine and matched to their relevant patient care areas that hold expenses. For example, radiology services are mapped to the radiology department and doctors' ward rounds to the doctor's department or clinical service units. Therefore, the clinical costing is the matching of the clinical work and its measures to the cost area which holds the expenses for that work. The result of this stage is "fully mapped patient care services". In the costing world, it is said that clinical costing starts with "counting" on the patient care activity side.

Allocation of Costs

The clinical costing at the patient episode level is all about matching the work performed (services) with the costs incurred (expenses by patient care area) based on a weighting system (relative value units) or actual resource utilisation and its intensity, such as clinician contact time and dependency-scores-weighted nursing time. Direct cost is the cost that can be traced back specifically and exclusively to patient care activities (e.g. nursing costs) whereas indirect cost is an overhead (e.g. utility and administrative costs). Total cost is an addition of direct and indirect costs.

The Costed Activity-Based Funding Service Streams

Clinical costing in Victoria, Australia, covers a whole range of clinical care such as acute admitted care, emergency department, non-admitted and subacute care, and mental health. The costing data for acute admitted care are submitted to the Victorian Department of Health as the Victorian Admitted Episodes Dataset (VAED). Similarly, the costing data for emergency departments are linked to patient episode level data in the Victorian Emergency Minimum Dataset (VEMD). The costing data across all non-admitted services will inform the costs of activity in the Victorian Integrated Non Admitted Health (VINAH) dataset. The costing data across subacute services (both admitted and non-admitted) at all Health Services will be collected in future Victorian Cost Data Collection (VCDC), and linked to the VAED and VINAH datasets. However, there is limited costing data collected for Victoria's mental health care services.

The Victorian Department of Health runs a cost modelling study for participating *small rural health services* to analyse costs at the diagnosis-related group (DRG) level (Chapko et al., 2009). The Department of Health provides a unique identifier to link costing information to the other Victorian health care data collection for further analyses and research.

Depreciation in the State of Victoria, Australia, is treated as capital and is not charged to the operating account, and excluded for clinical costing purposes (The Clinical Costing Standards Association of Australia, 2012). All operational expenses are included and reconciled with the general ledger.

Empowering Clinical Costing or From the Margins to the Mainstream

Current clinical costing function in Victorian public hospitals is generally limited to compliance reporting to submit an annual Victorian Cost Data Collection (VCDC) to the Department of Health, Victoria. The National Hospital Cost Data Collection (NHCDC) combines costing submissions from all Australian states to study national efficient price which is used to determine the Commonwealth's contribution for activity-based funded public hospital services (Council of Australian Governments, 2011). Independent Hospital Pricing Authority calculates national cost weights and informs funding models.

Recently, an enhanced clinical costing function has been expected to assist internal clinical improvements. Clinical costing teams seem to be under-resourced and find it hard to cope with these expectations, and hence, the wellbeing of the teams could be compromised. At the same time, they are struggling to master enormous amount of organisational knowledge covering multiple clinical services. These clinical costers are also accountable for regular costing database maintenance and quality assurance as well as trying to meet the demands of compliance. Current investment in clinical costing could be measured with the clinical costing resource rate by dividing the full-time equivalent of clinical costers with that of clinicians and managers for a comparison across health services.

An approach called "Ottawa Charter for Health Promotion" could be adapted to reorient resources to the clinical costing team, build its workforce development and continuous learning culture, strengthen its actions (building on strengths) and create supportive environments (World Health Organisation, 1986). This approach needs leaders with vision who value the function of clinical costing.

The resourcing and resourcefulness concept highlights the importance of supportive environments for clinical costing teams to fulfil their duties. The concept respects clinical costers for their intrinsic capacity to cope with the demands (resilience or resourcefulness), even if this is not evident at a given moment, and that, in the context of a supportive and appropriately resourced environment (resourcing), they are the best judges of how to realise that capacity (Joubert & Raeburn, 1998).

Resourcing can take a form of clinically-friendly *reporting structure* with the executive support, for example, direct reporting arrangement to clinical directors and executives or via clinical steering committees who value clinical costing functions. Clinical costing communities are encouraged to join appropriate professional bodies, such as the Australian Health Services Financial Management Association or public health associations, for their professional development. These empowerment strategies could eventually reinforce one's sense of identity and self-worth by providing opportunities for friendship and rapid learning, and by mitigating feelings of isolation (Beiser, 1988).

For resourcefulness, clinical costers could strive for mastering health economics and understanding clinical business by staying with a clinical phenomenon or a lived immersion in the context over a long period of time (for example, working in operating theatres for a period of time to improve its clinical business) (Heron, 1996; Trochim, 2000). Knowledge of medicine, public health and epidemiology, as well as health informatics will enable them to achieve successful integration into mainstream clinical communities. Clinical costers are usually seen as "mini" health ministers who master multiple subject areas as well as future directions of the health sector. Clinical costers, nowadays, are regarded as one of the most important healthcare workforces despite the fact that they are not easily visible and sufficiently valued in mainstream clinical communities.

Clinician participation could also help realise resource reorientation to clinical costing. Genuine clinician participation goes beyond a "usual" clinical engagement where clinical costers and clinicians usually play their roles as professional knowledge extractors in an *ad hoc* basis (Fals-Borda, 1987; Freire,

1970; Habermas, 1987; Heron, 1996). This type of enduring participation envisages that all participants are enablers of collective improvements in clinical costing and healthcare research. A collective vision could be set to facilitate this participation, for example, *"To provide timely, relevant and accurate clinical costing analyses for identifying cost-effective care through research"*. Ibn Khaldun's social solidarity concept could guide in making collective self-determination and unified actions to achieve goals, while paying mutual respect to each other (Alatas, 2006; Khaldūn, 1969). This *clinically-driven* approach to clinical costing is the key to find ways to achieve value-based quality healthcare in a health service (Murphy & McElroy, 2014).

To implement this participatory approach, clinical costers are required to work closely with all healthcare workers, such as academics for research, service managers and medical directors for cost-benefit analyses, and hospital pricing authorities for funding negotiations, as well as benchmarking bodies to find opportunities to improve.

Clinical costers are also expected to maintain clinically validated and relevant costing datasets. For example, a good clinical costing dataset should be able to provide clinical data linkages amongst costing, clinical information, health informatics, financial, human resources and administrative datasets (the "unifying information systems concept") while retaining original information characteristics (or information "salad bowl" which is unique and different from "melting pots" where original characteristics are lost).

In the next section, potential analytic applications of clinical costing will be discussed.

Management Application: Measuring the Right Thing

"What is not measured cannot be managed or improved."(Kaplan & Porter, 2011, p. 48)

Every resource use in a health service is a clinical decision because clinicians make decisions on clinical service utilisations. The role of clinical costing in a health service is to find opportunities to improve. Clinical costers are expected to fully understand what cost measures are important for business performance improvements. In this section, some of these useful measures will be discussed.

Overheads

Overhead allocation is one of the most important clinical costing components and needs thorough investigation to allocate accurately (Kaplan & Porter, 2011). The costs of support services are allocated as indirect costs by using weights such as direct costs, head count, floor space, and the number of patients. Inappropriate weighting can affect management decision makings.

For example, the Schon Klinik in Germany had reduced the capacity of its knee replacement rehabilitation units in the past because the existing cost system reported as less profitable than acute care units. An audit was launched to find out the allocation rules in the costing system. The audit showed that support costs were mainly allocated on the basis of length of stay, not on the patient's actual utilisation of support resources. Since these knee replacement patients spent 75% of their stay in the rehabilitation units, the majority of the support service costs had been allocated to the rehabilitation units rather than to the acute care wards where most support service resources were consumed. The Schon Klinik began to see better financial performance in these units after introducing an appropriate allocation rule, and the capacity of the rehabilitation units was expanded. Ways to reduce demand for support services could now be sought without compromising safety. These efforts, in turn, will reduce spending on scarce health care resources.

However, there may be a time lag adjusting to match the permanently reduced resource consumption with future activity levels. It is expected that predicted changes in activity will be translated into equivalent and timely cash flow changes to remove unused capacities (Cooper & Kaplan, 1992; Drury, 2005). Regular and reliable clinical costing reports could enable management to explore opportunities for improving business processes and mitigating resources. For flexible resources, cash flow changes might introduce decisions to reduce activity, such as dropping a clinical service; but for committed resources such as operating theatres, an automatic reduction in expenditure will not follow (Kaplan, 1994), and an additional capacity will be created as a result, because the addition of cost of resources used and cost of unused capacity equals the cost of resources supplied.

Decisions on the reduction of resource supply usually arise from the sum of many interventions in the health service rather than a single service termination (Drury, 2005). Clinical costing could help in managing used and unused capacity by providing capacity cost rates, such as theatre cost per theatre duration and intensive care unit cost per day. Comparison analyses of these capacity cost rates with other comparable health services could provide insights into the level of resource inputs. The formula to calculate the capacity cost rate for resource is dividing the expenses attributable to resource by the available capacity of resource.

Since clinical costing systems usually capture all relevant costs of a patient, managers are well informed to address "how to deliver improved clinical outcomes at a lower total cost", and they will be positioned to achieve a true "bending of the cost curve" built from within the system through mutual understanding of clinical communities (Kaplan & Porter, 2011). These clinical communities need to be built from within with their own self-determination to reach their chosen destiny of improved clinical outcomes. External forces for change do not usually achieve a sustainable clinical improvement. The focus should be on future service deliveries based on regular clinical costing reports. That is why, clinical costing datasets should be updated on an annual or semi-annual basis to be relevant for management decision makings (Drury, 2005).

Opportunities to Improve

Duplication of tasks equals waste. A typical hospital organises their clinical departments around specialties. The downside of this arrangement is the interruption of patient flow from one service to another and duplication of tasks such as separate bookings and referrals. Since clinical costing information is essentially an electronic record of a patient journey, it helps discover the high costs of these duplications or waste (Kaplan & Porter, 2011). Clinical costing could show high cost processes in the patient journey and ways to free up unused capacities. The freed capacity could then be redeployed to meet other critical clinical needs.

The concept of eliminating waste is one of the biggest opportunities for lowering costs with the same or improved clinical outcomes, such as reducing blood wastage and associated personnel costs. After removing redundant processes, physicians and nurses may shift their time to patient care activities, such as providing health education, and thereby contributing to efficiency and better patient outcomes. The amount of the time released for direct patient care can be measured to monitor this process improvement. If health services use accurate clinical costing information to translate various process improvement approaches into actual spending reductions a genuine bending of the cost curve could be achieved without having to ration care or compromise its quality and safety.

Budgeting

Inadequate applications of clinical costing information could result in time-consuming budgeting processes and frustration (Kaplan & Porter, 2011). The quantity of each service extracted from clinical costing can be multiplied by its monthly cost with the following formula to derive an estimated monthly expense budget for future periods. The formula to calculate the estimated monthly expense budget is by multiplying the quantity of service with the monthly service cost. In this way of budgeting can highlight how process improvements lead to the reduction of expenditure on elimination of unused resources.

Clinical costing's fact-based predictive capability is valuable for long-term plans. These plans are logically derived from strategic goals consistent with the relationship between goal achievement and resource intensity, for example, having Weighted Inlier Equivalent Separation targets in clinical costing. Based on new levels of productivity, forecasting of the volume of transactions for the coming budget period can be derived. This analytic capability of clinical costing in budget preparation is an advantage over the traditional accounting and a far cry from the "let's add ten per cent to last year's budget" (Turney, 2008).

Contribution Margin

The concept of fixed and variable costs is important in managing health services. Nearly 95% personnel costs are considered to be fixed, but these costs are actually under management control and 'variable' in nature (Kaplan & Porter, 2011). There are no fixed costs in the long run, because all inputs can be varied, (Frank & Bernanke, 2009, p. 235). Clinical costing can report on contribution margin if the revenue and variable cost information are available in the system. Contribution margin is calculated by extracting variable expenses from sales.

The break-even point is reached when sufficient total contribution covers fixed costs. After these fixed costs are covered the contribution margin starts to contribute to profit. The break-even point divides the fixed costs by the contribution per unit (Drury, 2005, p. 271).

Clinical costing could reveal the proportion of unprofitable, breakeven and profitable clinical services in the form of an 'S' curve or "winners/losers graph" (Turney, 2008). Therefore, health services can focus on profitable services and patient segments, as well as redesigning of services to remove cost, and elimination of non-value added activities. This new focus could transform health services from "worst financial performance in class" to "best in class" (Turney, 1991, 1992).

Data mining and statistical analyses of clinical costing could highlight the drivers of financial performance. The summary-level analysis could be used to find opportunities. In-depth analyses or special studies may be required as a secondary phase to improve healthcare processes based on the compelling evidences from the initial summary-level analysis. Monitoring cost reports could be developed to investigate the long-term success of the change (Turney, 2008).

Accurate performance measures plays an important role in setting targets, monitoring performance, predicting future performance, and undertaking corrective (not reactive) actions. In healthcare services which integrate clinical costing with performance management, the activity costs, for example, the theatre cost per labour hours based on the Ibn Khaldūn's labour effort theory (Khaldūn, 1967), could provide the focal points for setting goals and measuring performance.

Healthcare services are working to be more efficient by using fewer people without compromising quality. It is difficult to predict how many doctors and nurses with certain skills and capabilities are needed and it is more difficult to justify the need for additional resources in a difficult economic climate.

Clinical costing could be used for human capital management by forecasting the transaction level of services and their resource needs. Statistical forecasting provides an accurate number of human resources required to support new levels of productivity. Many organisations are using human capital management solutions to bring all employee information into a single platform for retirement planning, succession, stratification of skills and forecasting of areas of skill shortage (Turney, 2008). Clinical costing can be such a platform, which could help improve sustainability in terms of making business decisions on sustainability, compliance and transparency of reporting.

Clinical costing has placed itself at the centre of performance management in public hospitals since activity-based management can be seen as clinical costing in action (Cooper & Kaplan, 1992; Kaplan & Porter, 2011; Turney, 2008).

Clinical Applications: Quality Care at Minimum Cost (Value-Based Care)

Clinical applications of costing datasets can take many dimensions from 'blue skies' research to translational research. Different clinical decisions need different health economics evaluations. Clinical costing holds unified, patient-centred clinical service utilisation, administrative and financial information, as well as the clinical coding such as the 'present on admission' status (which is used to derive the classification of hospital acquired diagnoses or CHADx), and most importantly, their associated cost and revenue. The level of information available varies from hospital to hospital but is mostly consistent.

Clinical costing is expected to provide clinically-validated cost results and value-added analyses with some forms of risk adjustment such as age and the Charlson comorbidity index (D'Hoore, Bouckaert, & Tilquin, 1996; Kaplan & Porter, 2011; Schneeweiss & Maclure, 2000; Turney, 2008). The primary role of clinical costers is to explain the methodology of clinical costing to clinicians and provide statistically sound analyses. Clinicians can aggregate and analyse the cost results at the *service level by specialty* or specific conditions (Kaplan & Porter, 2011). In Switzerland, a chronic morbidity score based on pharmacy utilisation is used to predict future medical expenditure for the planning of resource allocation (Huber, Schneeweiss, Signorell, & Reich, 2013). There are many ways to analyse clinical endeavours and their financial impact using clinical costing (Jackson, Michel, Roberts, Jorm, & Wakefield, 2009), and some of these major health economics evaluations are described briefly in the following section for the benefits of researchers.

Cost-Consequence Analysis (CCA)

Cost-consequence analysis presents the costs and consequences of numerous interventions with the results presented in a disconnected way and not combined with costs (costs and outcomes are presented as is). CCA is comparable to cost effectiveness analysis in that results are calculated in a natural unit of effect (Mauskopf, Paul, Grant, & Stergachis, 1998). Using this approach, the impact of a new treatment on lifetime resource use and costs, including productivity losses and health outcomes, is estimated and presented in a tabular format. CCA enables health decision-makers to select the measures most relevant to their perspective and will also give them confidence of data credibility to use as the basis for resource allocation.

For example, a randomised trial with a cost-consequence analysis after laparoscopic and abdominal hysterectomy reported that a change in surgical technique from abdominal to laparoscopic hysterectomy was possible without compromising health outcomes, and it provided substantial financial benefits to

society (Ellstrom, Ferraz-Nunes, Hahlin, & Olsson, 1998). The postoperative health status improved significantly faster after laparoscopic hysterectomy than after abdominal hysterectomy. The direct costs (hospital costs) were 1.7% higher and the indirect costs (loss of production value) 50.3% lower for patients undergoing laparoscopic surgery. The total costs were 23.1% lower after laparoscopic hysterectomy.

Cost Minimisation Analysis (CMA)

Cost minimisation is a form of calculating pharmaceutical costs to determine the least costly drug or therapeutic modality (World Health Organisation, 2003). Cost minimisation reflects the cost of administering a dose and can only be used for comparing two drugs that have been shown to be equivalent in therapeutic effects. The focus is on the estimation of the joint density of cost and effect differences. Although CMA may be justified as a legitimate way of analysis for a randomised trial to test the explicit hypothesis of equivalence in outcomes between two therapies, researchers should also proceed to do a secondary analysis of cost-effectiveness if the data show significant differences in effectiveness between two treatments (Briggs & O'Brien, 2001; O'Brien et al., 1999). For example, in a study comparing two treatments for deep vein thrombosis (DVT) – in-hospital treatment with unfractionated heparin versus at-home therapy with low molecular weight heparin – researchers should focus on cost-effectiveness rather than on inferential statistics of cost or effect differences (Briggs & O'Brien, 2001).

Cost of Illness (COI)

The COI is often used to measure the monetised benefits of health programs. The total cost avoided represents program benefits and economic consequences of an illness. The direct cost of an illness represents the cost of medical interventions currently available and the indirect cost (productivity losses) measures the affected population's education level, skill level, income, sick-leave benefits, and insurance coverage. However, the lack of accurate estimates of true economic costs for direct expenses and productivity losses limits its use (Centers for Disease Control and Prevention, 2014). Despite these limitations, an apparent ease of use makes it a useful economic tool to guide resource allocation.

Marginal Cost Study (MC)

MC is the cost associated with the increase in total cost that results from carrying out one additional unit of an activity within the same health intervention (Frank & Bernanke, 2009). It is used in making program expansion decisions (Centers for Disease Control and Prevention, 2014). MC is calculated by dividing the change in total cost with the change in quantity.

Since the marginal cost measures the effect of making an additional investment in the intervention, it can be used to analyse the change in total costs from changing an activity level or outcome and determine the optimal activity level.

A production process is defined to have increasing returns to scale if output changes by more than the proportion changed by all inputs (Frank & Bernanke, 2009, p. 238). When average and marginal costs are equal there are no additional economies of scale, because expanding output beyond that point increases average cost. As long as MC is lower than the average cost, economies of scale are possible.

Calculating MC and average cost for a series of capacities provides potential economies of scale for making maximum advantage of the resources invested while minimising total costs. Similarly, the

benefit of an additional unit of the activity is the *marginal benefit* of that activity. The cost-benefit rule is to keep increasing the level of activity as long as its marginal benefit exceeds its marginal cost.

There are three important decision pitfalls in measuring relevant costs and benefits, (Frank & Bernanke, 2009). A change in cost or benefit cannot be considered as insignificant if the change is a small proportion of the original amount. Absolute dollar amounts rather than proportions are important in these measurements. For example, the same decision should be made for buying a $2,010 laptop or a $15 computer game in a downtown store when the same laptop and computer game are available at $2,020 and $25 respectively at the nearby store based on the absolute dollar amount saved rather than on the proportion (0.5% for the laptop and 40% for the game) saved on the original price.

All relevant costs, including the implicit value of alternatives that must be foregone to take the action (the opportunity cost), must be measured for making good decisions. Resources may have high implicit costs if best alternative use has high values (even if they are received for free). For example, the implicit costs of dialysis, especially the treatment cost of complications for a chosen dialysis modality and those for an alternative option, need to be considered in economic evaluations of different dialysis modalities.

The only costs and benefits that are relevant to perform an action are those that would result from taking that action. It is important to ignore 'sunk' costs, because they cannot be recovered at the time of making decisions.

Decisions cannot be made for increasing an activity if its *average* benefit exceeds its *average* cost, because the "cost-benefit principle" points out that the level of an activity should only be increased if its *marginal* benefit exceeds its *marginal* cost (Frank & Bernanke, 2009, p. 14).

In summary, the marginal costs and benefits and the implicit costs are important for good decision makings, while sunk costs and average costs and benefits are irrelevant.

Cost Effectiveness Analysis (CEA)

CEA is the evaluation of the costs and the outcomes of interventions designed to improve health (Weinstein, Siegel, Gold, Kamlet, & Russell, 1996). It is used to compare costs and years of life gained for such interventions such as breast cancer screening and coronary bypass surgery. The result is summarised in a series of cost-effectiveness ratios (CER) measuring the cost of achieving one unit of health outcome, for example, the cost per year of life gained. It illuminates the "opportunity cost" of each choice, i.e. the health benefits lost because the next-best alternative was not selected. The CER with the lowest cost per year gained are the most efficient ways of improving health.

Researchers need to consider not only those who gain health but those who pay for it. All resource costs should be included regardless of who incurs them. A CEA that studies the broad allocation of health resources would need to evaluate all health outcomes and costs of the entire national population; for example, older people can develop neurological problems from folic acid supplementation in cereal grains (Weinstein et al., 1996). Concepts of fairness and justice, and the benefits and costs outside the health sector and direct comparability of the quality adjusted life years (QALYs) created by the two kinds of interventions need to be considered. Generally, CEA is not a complete decision making process in the real world; rather, it provides crucial information for good decisions.

Incremental Cost-Effective Ratio (ICER) and Plane (ICEP) and Cost-Effectiveness Acceptability Curves (CEAC)

An ICER is a measure of the additional cost per unit of health gain (Fenwick, Marshall, Levy, & Nichol, 2006).

Effects are measured in life years gained. In asthma, effects can be measured in symptom-free days; for example, a comprehensive social worker-based education program and environmental control in children with asthma improved outcomes, at a mean additional cost of $9.20 per symptom-free day (95% CI, -$12.56 to $55.29) when compared with usual care (Sullivan et al., 2002).

The incremental cost and effect can be represented visually using the ICEP (Fenwick et al., 2006). The horizontal axis divides the plane into positive cost above and negative cost below, and the vertical axis into positive effect to the right and negative effect to the left. The ICEP shows four quadrants with different implications. If the ICER for rate-control compared to rhythm-control for atrial fibrillation fell in the south-east quadrant, with negative costs and positive effects, rate-control would be more effective and less expensive. Interventions falling in this quadrant are always considered cost-effective. However, in order to make decisions on "value for money", the ICER must be compared to a specified ceiling price (maximum acceptable ceiling ratio or λ), which is the maximum amount decision-makers are willing to pay for health effects. For example, if a decision-maker is willing to pay $200,000 for a year of life, the intervention is considered cost-effective if the ICER is below $200,000 per life year gained.

There is an uncertainty in decision makings due to imperfect estimation of intervention effectiveness and resource costs. Cost-effectiveness acceptability curves (CEAC) were introduced to indicate the probability that an intervention is cost-effective in comparison to the alternative for a range of λ. CEAC is useful for considering economic consequences of treatment decisions.

Cost-Benefit Analysis (CBA)

CBA is a comprehensive and theoretically sound method of economic evaluation and used to aid healthcare decision making. It is based on the "willingness to pay" approach (Robinson, 1993a). The main difference between CBA and other methods of economic evaluation mentioned earlier is that it places monetary values on both the inputs (costs) and the outcomes (health benefits). This attachment of monetary values to outcomes facilitates the interpretation of whether a particular intervention offers an overall *net* gain to society (its total benefits exceeds its total costs). CEA and cost-utility analysis (CUA) do not offer this option because they measure costs and benefits in different units. Transforming complex health outcomes to a single monetary value is not always easy; therefore, health researchers are relying on CEA and CUA. Valuation of benefits can be based on human capital such as salaries (productivity gains) or peoples' observed preferences (willingness to pay for a healthcare outcome) (Mishan & Quah, 2007; Robinson, 1993a). The willingness to pay approach is only suitable where qualitative health outcomes are achievable such as in pharmaceuticals, and where payments are small in comparison to income. A method which measures quantity and quality of life is cost utility analysis. This will be discussed next.

Cost Utility Analysis (CUA)

CUA is an economic evaluation for assessing the efficiency of healthcare interventions. The term utility is derived from von Neumann and Morgenstern's theory of rational decision making under uncertainty

(Coons & Kaplan, 1996; Neumann & Weinstein, 1991). It is different from CBA and CEA. CBA suffers from the difficulty of translating all costs and outcomes into monetary values, and carries the potential for discrimination because it favours treatment for people who are working or wealthier. CEA is limited by its inability to simultaneously include multiple outcomes from the same intervention or to compare interventions with different outcomes. The outcome measure for CEA is in natural units, for example, life years saved; but there is no attempt to measure the quality of life. To overcome the limitations of both CBA and CEA, CUA was invented to measure the quality adjusted life years (QALY) gained as a common outcome denominator to compare multiple interventions. Therefore, CUA combines the quantity and quality of life in its analysis. It is appropriate when comparing interventions which are not expected to have an impact on mortality, but a potential impact on function and wellbeing. It is also suitable for comparing interventions which have multiple outcomes and there is a need to have a common unit of outcome for comparison (Coons & Kaplan, 1996).

A reference case or a standard set of methodology is required in CUA. A common method of reporting the results of CUA takes a form of a league table showing cost-utility ratios. Healthcare interventions are ranked by cost per QALY gained. Since healthcare resources are limited, they should be used for those interventions which produce the greatest benefit for the greatest number of people. CUA provides a systematic approach to comparing ways of utilising these scarce resources most efficiently in the process of meeting healthcare demands. In summary, it appears to be the best economic evaluation method for decision makings on allocating healthcare resources (Robinson, 1993b).

Examples of clinical costing in action are discussed below for the readers to visualise what a clinical costing function looks like in the real world.

Clinical Costing in Action 1: The Role of PET in FUO

Background

In 2014, an Australian public hospital's senior physician came to see the clinical costing unit to investigate a clinical improvement opportunity. Research shows that treating cases of Fever of Unknown Origin (FUO) with early Positron Emission Tomography (PET) in the admission period could be cost effective in terms of reducing other unnecessary investigations and hospital stays, as well as improving treatment strategies (Nakayo et al., 2012; Seshadri, Sonoda, Lever, & Balan, 2012).

Intervention

The clinical coster worked with the physician on a day-to-day basis to conduct all stages of research – from formulating a study design and getting ethics approval to analysing the data and publishing the results. Cost analyses involved descriptive statistics at clinical service utilisation levels (comparing pre- and post-PET costs and outcomes in the admission period). Results showed that early PET was helpful in finding final diagnoses and establishing definitive treatment, as well as could reduce significant hospital stays and other investigations. Assistance was given for the preparations of oral and poster presentations to disseminate the results in New Zealand and Australia.

Results of Involvement

The major benefits of involvement in this research project were experiential knowledge of clinical business and research skills. The direct effect on clinical costing as a whole was the clinically-validated clinical costing information and credibility. The quality of the data was improved indirectly in the process. The clinical costing unit started seeing the support and endorsement of clinical costing information and function from the clinical communities in this active application. Mutual respect and trust were built between clinical communities and clinical costing unit. Since this study involved many clinical departments, the inter-disciplinary solidarity and camaraderie were successfully established for future improvement research. The latest development was that this small scale study would be expanded to form a large scale, prospective study and possible clinical guidelines because of its promising results. This project made an entry point to clinical communities successfully.

Clinical Costing in Action 2: Blood Costing

Background

Blood costs are significant in any healthcare. However, these costs are currently held by the Department of Health in Victoria, Australia, and are not included in clinical costing (Department of Health Victoria, 2014). Now the Department is in transition to full national compliance by submitting these costs to 2013-14 national cost data collection. Clinical costers in Victoria were provided with blood expenditure and Australian Classification of Health Intervention (ACHI) codes to identify patients who received blood transfusion.

Intervention

A new cost centre/account combination, Y0400 Blood/24101 specialised blood and blood products, was created to hold the expenditure. Patient-level blood transfusion information from the hospital blood bank was extracted to build blood services which were mapped to the newly-created patient care area of blood. The patient-level information included every blood product issued by unique identifier, ward, product type and blood group. The patient-level blood information seemed to be superior to the costing of services based on ACHI codes which might lack information on transfusion frequency and blood product types. An allocation rule was set by multiplying the quantity of blood transfusion with actual charge of the blood product. Ninety-seven percent of records were linked to inpatients in the first load into the costing system and considered as reasonable. Since the account 24101 was used to allocate hospital overheads from the board and executive areas, 17% of the total blood cost represented the indirect component. An appropriate indirect allocation rule was implemented to correct overhead distributions in the system.

Results of Blood Costing and Its Potential Impact

The direct benefits from this blood costing were multiple. Firstly, the indirect allocation rules were updated in the system. Secondly, the intimate knowledge of blood transfusion was gained. This knowledge could open up a whole new horizon of opportunities to improve blood-related clinical care.

Blood cost data could be used in many clinical improvement projects, because blood is a gift and needs a wise use. For example, Auckland District Health Board's "Why Use Two? When One Will Do" Project based on the message of "transfusion one unit of blood at a time reduces the risk of an adverse event" reported that $2.6 million of New Zealand dollars were saved in the first year of the project life. The project received the Treasury Award for Improving Public Value through Business Transformation because it not only improved public safety but also protected the precious stocks of blood (Institute of Public Administration New Zealand, 2012). One of the outcomes of blood costing in Victoria is that clinical costing could now contribute to similar blood-related improvement projects.

Solutions and Recommendations

Generally, clinical costing information is under-utilised for identifying value-based health care due to lack of organisational support and a failure to use the information actively. Therefore, it is still at the margins of clinical communities. The author would like immediate changes and actions to take place for utilising the power of clinical costing to improve care or take clinical costing to the mainstream (clinical communities), but, without the certainty of this, he would like to suggest what steps are absolutely necessary to enhance the current clinical costing function as a foundation to moving forward beyond compliance reporting.

First and foremost, a clinical costing dataset quality framework must be incorporated into the hospital system. Everyone is responsible for data quality and errors must be rectified promptly. Key accountabilities for clinical costing should also be established to investigate resource-friendly audit cycles. There are a few things that need to be done before getting clinical costing embedded into the management and clinical decision makings. Some of them are: a clinical costing methodology manual, an interactive tool and regular reports at patient level, speciality and service, and benchmarking reports on staff time, cost drivers (theatre duration, length of stay and prostheses) and capacity cost rates. These information elements must be readily available in a data warehouse.

The apparent lack of costing information credibility in clinical communities has left health professionals and policy makers at a loss as to how to formulate research, policy and practice to promote health or even how to 'engage' clinical communities. In a public hospital, where the clinical costing dataset is alienated from management decision makings (Mawilmada, Smith, & Sahama, 2012) and even from the improvement processes of clinical communities, legitimacy of clinical costing datasets is hard won. Clinical costers should join hands together to formulate a data quality framework where clinical services will take a share of responsibilities. This approach is a true ground up and "community knows best" orientation. Materiality and quality score from Healthcare Financial Management Association (UK) could be an example in which the materiality and quality of costing systems and processes can be measured against set criteria (Healthcare Financial Management Association, 2015).

Second, strategies for clinician participation in clinical costing and inter-sectoral collaborations must be developed. Clinical costing literacy could be taught in medicine, public health and health informatics in a form of economic evaluation practicum paper. The lack of clinical costing literacy may hinder the active use of this information in future clinical practice. One of the best methods of auditing clinical costing could be using the costing data to try to answer clinical questions (J. Harris, personal communication, August 27, 2014).

The inter-sectoral collaboration could involve benchmarking organisations, software vendors and health authorities for implementing cross-validations of datasets and data quality frameworks, as well as academic institutions for improving cost allocation methodologies and costing processes.

Third, clinical costing needs leaders with vision who could value the function and capability of clinical costing. The sustainability of clinical costing function cannot be maintained without organisational support. Fulfilling these needs would bring clinical costing from the margins to the mainstream.

FUTURE RESEARCH DIRECTIONS

Since the clinical costing processing time is usually lengthy future research could focus on investigating processing time improvements to provide timely and relevant (almost in real time) clinical costing information for active use. The major focus on programming and processing would be how to automate the entire process without a significant user intervention.

Future research could focus on establishing criteria to measure the quality of clinical costing information, in a similar way as Jones criteria for diagnosis of rheumatic fever (Edwards & Bouchier, 1992).

Future research could investigate ways to promote clinical costing information, clinician participation and organisational support. For example, the central question could be addressed by the research is: *What are the ways by which clinical communities can be influenced through their involvement clinical costing.*

Investigations of ways to make costed information available to clinicians would be valuable as a wider information management framework (C. Fan, personal communication, February 9, 2015), because the death of clinical costing would be the lack of its active use and clinicians' support (P. Horan, personal communication, February 12, 2015).

Researchers could also concentrate on creating unique national healthcare user identifiers to facilitate clinical data linkages (a statistical tool which allows linking of different datasets kept in different locations that relate to the same individual), which could break down the usual *ghettoised* information, and therefore, an appropriate economic evaluation can be performed on various clinical settings to choose the most-preferred value-based option for the patients (Liu, Yang, Yeh, & Wang, 2006). This type of research would benefit healthcare policies and equitable resource allocations.

Future research could focus on "how to improve access to quality care at minimum costs" (value-based care) by studying gaps in access to care, cost and quality between healthcare programs in different countries based on their epidemiological profiles (Bhattacharyya et al., 2010; Reinhardt, 2008). For example, researchers need to find answers for why the administrative budget stays at just one per cent of the total spending in Taiwan's highly efficient national health insurance system which covers the entire population of 23 million (Tsung-Mei Cheng, personal communication, February 25, 2012) whereas administration accounts for 31% of health care expenditure in the United States and 16.7% in Canada (Lee et al., 2010; Woolhandler, Campbell, & Himmelstein, 2003). Aravind Eye Care System (India) performs a cataract surgery in 10 minutes – one third of the industry standard of 30 minutes. Despite the shared space for patients, the infection rates are 4 per 10,000 cases, which is better than the published rate in the UK of 6 per 10,000. Researchers could try to answer how to assess the success of innovative healthcare solutions and nurture an environment for these innovations to scale.

Researchers would need to investigate how to retain clinical costing workforce. Disempowered and distressed workforce is not sustainable. Clinical costers are multi-skilled and a real asset to the organisation. Challenges are that they can easily find positions at a higher level than in costing (C. Fan, personal

communication, February 9, 2015) and move easily to other areas of management (J. Harris, personal communication, August 25, 2014), because they have intimate knowledge of hospital business (as mentioned earlier, they are "mini" health ministers).

Finally, academic institutions could look at training courses for clinical costing. There are three segments of audience for these courses: clinicians, managers and candidates for clinical coster positions. These courses could take many forms, such as workshops, training modules or summer courses. Research on clinical costing curriculum development would be well received.

CONCLUSION

Until recently, clinical costing has received very little clinician and management attention. Previous research done on this subject overlooked the issues of clinical costing in general and had not introduced any specific solution to improve the present situation faced by clinical costers, one of the smallest, yet valuable, hospital communities. On the other hand, clinical costing has its own specific obstacles and needs an enabling approach to overcome these barriers and to foster successful integration into the mainstream clinical communities. They are currently situated at the margins of hospital communities and invisible to clinical services. This study has attempted to fill the gap of lack of empowerment and solution-based research on clinical costing communities. It has also shown the values and capabilities of clinical costing information and workforce to help discover value-based healthcare.

To do that, we need active participation not only from clinicians, but also from all sectors to achieve our ultimate goal, which is the wellbeing of our patients. But, this is, the author suggests, a national responsibility, because it is a system-wide issue. We cannot have a clinical coster in each and every hospital, but this paper can be a voice in the ear of all clinicians, and the conscience sitting on their shoulders. Every clinician, with the knowledge from this paper, can take responsibility for creating an equitable and value-based care based on clinical costing information, which will, in turn, take care of rising healthcare costs on its own. And start, for once, to think about clinical costing.

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KEY TERMS AND DEFINITIONS

Clinical Costing: A discipline which studies the cost of resources used to deliver patient care.

Clinical Data Linkage: It is a statistical tool which allows linking of different datasets kept in different locations that relate to the same individual.

Direct Cost: It is the cost that can be traced back to the direct patient care activity (e.g. nursing costs).

Health Economics: It is a discipline within Public Health and Health Systems concerned with efficiency, effectiveness, value and behaviour in the consumption of health care.

Indirect Cost: It is the overhead cost that cannot be traced back to the direct patient care activity (e.g. utility and administrative costs).

Patient Level Costing: It measures and costs resource consumption of each patient care activity. It provides more accurate costs at patient level than the top-down approach. It is also known as micro-costing, bottom-up costing and activity-based costing.

Public Health: It is the science and art of preventing disease, prolonging life and promoting health through the organised efforts of society.

Salad-Bowl Information Strategy: It is an information strategy which retains the original characteristics of the information. The salad bowl is different from the "melting pot" where the original characteristics are lost.

Total Cost: It is an addition of direct and indirect costs.

Value-Based Healthcare: It is the healthcare conferring a patient-centred, clinical benefit at lowest unit cost.

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Chapter 19
The Administrative Policy Quandary in Canada's Health Service Organizations

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ABSTRACT

This chapter examines the process for administrative health service policy development with respect to information sharing and decision-making as well as the relationship of policy to decision making. The challenges experienced by health service managers are identified. The administrative health policy experience in Nova Scotia is described. There is a need for integrated policy at multiple levels (public, clinical, and administrative). The quandary is that while working to share health information systems, most Canadian health service organizations continue to individually develop administrative health policy, expending more resources on policy writing than on translation/education, monitoring, or evaluation. By exploring the importance and nature of administrative policy as a foundation for quality improvement in healthcare delivery, a case is made for greater use of health informatics tools and processes.

INTRODUCTION

In its simplest form, a policy tells people what to do and a procedure tells how to do it. (Cryderman, 1999, p. 17)

Policies provide structure to decisions. They allow consistent, informed decisions to be made about situations that have previously been encountered in health organizations, allowing clinicians, patients,

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users, and employees at any level to respond to a situation. Policies, based on the mission or purpose of the organization, provide the framework of objectives and measures that will allow decisions to be made and actions to be taken (Althaus, Bridgman, & Davis, 2007). Administrative policy is policy that: identifies the governing principle that enables or constrains decisions and action, is institution or group-wide, supports compliance with applicable law, and is mandated by the highest authority within the institution or group of institutions (University of Arizona, 2011).

According to the Canada Health Act, the primary objective of Canadian health care policy is "to protect, promote, and restore the physical and mental well-being of residents of Canada and to facilitate reasonable access to health services without financial or other barriers" (Nova Scotia Department of Health and Wellness, 2012, p. 9).

In this chapter, we explore the nature and purposes of administrative policy. We discuss the relationship of policy to decision making at both the administrative and clinical levels and the importance of well-developed policy for healthcare practice, as that relates to health information systems. We explore the importance and nature of administrative policy as a foundation for quality improvement in healthcare delivery through health informatics tools and processes such as electronic health records and health decision support systems; and for analysis for policy that focuses on the needs of policymakers.

We address the quandary that, while working to share health information systems, most Canadian health service organizations continue to individually develop administrative health policy, expending more resources on policy writing than on translation/education, monitoring or evaluation. Although policy can be most effective in bringing about improved health outcomes and organizational efficiencies, it is often difficult to see a relationship between health policy and health information systems. There is an absence of good policy-oriented data on which to base decisions. As an example, researchers found that Canada's wait-list information and management systems were inadequate and did not track outcomes to allow for continuous refinement of the criteria and weights used to prioritize patients in the wait-list policy (Lewis, Barer, Sanmartin, Sheps, Shortt, & McDonald, 2000). A systematic approach using health informatics skills and knowledge can empower policymakers to use data to develop policy, use information technologies to strategically communicate policy, and use outcomes data to monitor adherence to and effectiveness of policy.

Most research literature on health policy is concerned with public policy and clinical policy. There is a research-practice gap surrounding many aspects of administrative health policy (MacDonald, Bath, & Booth, 2008). The literature review for this chapter includes research on the relationship between policy and health informatics, and on health service managers' decision making at the administrative policy level. It focuses on what health service managers actually do rather than what they should do. We identify several challenges experienced by policymakers that provide opportunities for health informatics leadership and research. We also draw on experiences of OP3 (One Province, One Process, One Policy), a group working to share policies at the District Health Authority (DHA) level in Nova Scotia.

THE NATURE OF POLICY

With its many layers, health policy is more complex than "what to do" and "how to do it" (Cryderman, 1999, p. 17). The highest and most authoritative level is law or legislation. In Canada, the most general principles reside in the Canada Health Act where requirements for provincial and territorial government health service delivery are outlined. Each province or territory has legislation, such as the Nova Scotia

Health Services and Insurance Act, that describes the "what". The regulations contained in the legislation describe the "how" with the attendant penalties listed. The process of passing Bills into laws is one of the main tasks of provincial legislative assemblies. A Bill becomes an Act, and thus provincial law, when it receives Royal Assent by the Lieutenant Governor. Acts are then translated into multi-organization policies for the levels of authority that apply the legislation to healthcare delivery in each geographic area or for specific patient groupings. The purpose of any policy is to guide corporate and individual decision-making at each level.

There is a complex set of historical, cultural, and socio-political forces that shape the policy environment (Bell, 2010). A fundamental policy assertion is that government should not solve a problem until it understands the problem. Being able to perceive the explicit, implicit and pragmatic dimensions of the policy problem is key to understanding the barriers and challenges associated with a particular policy goal and context.

Two frameworks for examining multi-layered health policy have been identified. Caldwell and Mays (2012) use macro-meso-micro frame analysis to study the transition of a policy from high-level idea to program in action where macro is national policy, meso is national programme and micro is local context. The Canadian Health Services Research Foundation (2000) identified three types of health policy decisions: public policy decisions that deal with determining what health services will be provided; administrative policy decisions that are concerned with operations including where specific health services will be located and how they will be offered; and clinical policy decisions that include determining criteria to identify who qualifies for specific services and how these services are to be managed. The informational uncertainty of clinicians is resolved more readily by research than is the informational uncertainty faced by government and managers (Canadian Health Services Research Foundation, 2000).

Provincial and federal governments, health researchers, and leaders of professional associations are more likely to be concerned with public policy and clinical policy than they are with administrative policy. Administrative and operating policies are more likely to be concerns at local levels, such as in hospitals and DHAs where, despite expected similarities, each health service organization has traditionally developed its own policy and procedure documents.

There has been little discussion in the literature of the differences between the above policy decision types and how they are integrated. There is a lack of understanding of their relationship with each other and with legislation and professional standards; and of whether the different types of health policy are best developed together or separately. It is not clear whether and how these policy decision types might relate to strategic, consequential, and far-reaching decisions; tactical, medium-range and moderate decisions that support strategic decisions; and operational decisions—the everyday decisions that support tactical decisions (Heller, Drenth, Koopman, & Rus, 1988).

RELATIONSHIP BETWEEN POLICY AND HEALTH INFORMATICS

As it pertains to curricula, the concept of "Health Informatics Policy" is usually considered to encompass topics such as leadership and ethics; information security; health communication; social implications of computing; and, negotiation and conflict resolution (Martz, Zhang, & Ozanich, 2007).

The form and characteristics of the system, the information exchange it enables, the permitted access and the permitted sharing are all based on policies within the organization or from multiple organizations that place enablers and constraints on the system since each participating organization has its own

purposes. For example: who can enter prescriptions in a drug information system and whether the system is available near the bedside in a hospital (both policy based) often affects the quality of ordering and measurement of effectiveness. The policies, in turn, are based on the purpose and values of the organization. If improvement of patient health/condition is the over-riding purpose, health information systems have different characteristics and sharing procedures than if the over-riding purpose is risk management. Policies governing health information flow and use in one part of an organization may be different from those in another part of an organization based on unique purposes and constraints.

The concept of "Health Policy Informatics" as a subdiscipline of health informatics is emerging. It would tackle the challenges and problems arising from the multidimensional nature of information that is used for policy creation, dissemination, implementation, and evaluation; and would also address the challenges experienced by health service managers.

CHALLENGES EXPERIENCED BY HEALTH SERVICE MANAGERS

Knowledge Management

An organization's approach to knowledge management should be reflected in its culture, commitment to knowledge services, skills and use of information technology (Walton & Booth, 2004). The challenge is to ensure that information systems are designed to enable clinical knowledge management—supporting clinicians (of any kind) with information about, critical analysis of, and learning-orientated dissemination of health related information about individuals and groups (Booth & Brice, 2004). A feedback loop that uses data from health records along with research evidence from clinical literature provides knowledge about what works in the local context (Zitner, Paterson, & Fay, 1998).

A study that examined health services managers' information behaviour found that managers rarely referenced external research-based information for their decision making. They were more often influenced by explicit organizational knowledge such as policies and guidelines (MacDonald, Bath, & Booth, 2008).

Multiple Communities of Practice

Policymakers need to address the multidimensional aspects of knowledge-making for policy (Bell, 2010). There are perspectival differences in how knowledge is acquired and understood by the multiple communities that are impacted by policy as described in the CHAMP (Clinicians, Health Informaticians, Administrators, Medical Educators, Patients) framework (Paterson, 2008). Communities of practice have vested interests in both the process and the outcomes. An assessment of needs should consider the advantage to be gained or lost in the planning process (Mensink, 2004). The authors' experience is that multiple communities of practice rarely work collaboratively to influence policy and legislation that affects all of them.

Researchers need to pay attention to the gaps in policy as these tell their own story. In Keshavjee et al.'s policy framework analysis for Electronic Medical Records (EMR), they acknowledge that policy at the macro (public policy) level lags client needs significantly (Keshavjee, Manji, Singh, & Pairaudeau, 2009). That framework focused on policies such as incentives for uptake of EMRs, engagement of key stakeholders from affected communities of practice, creation of suitable Information and Communication Technology (ICT) infrastructure, implementation of interoperability standards, and engagement

of patients and their advocacy groups. To achieve interoperability with external systems in hospitals, laboratories and other health care provider communities, strong health information technology policies are required at the macro level.

Organizational Inertia

There are multiple and disparate processes for policy approval. A policy on the same topic, e.g., handheld devices, may come from multiple departments. In the experience of the authors, such policies may be identified as "universal" policy without reference to any approval process.

Embedding Policy in Information Systems

Whether or not to embed policy in information systems is a challenge, since an information system has a level of inertia inherent, such that it may continue to reflect outdated policy if no decision is made to systematically update it. This could lead to ignoring explicit policy because the current policy is not integrated with information systems and clinical workflow. This may result in workarounds by staff that are costly and a challenge to quality (Mensink & Paterson, 2010).

According to Grant et al., the health informatics research agenda should be dominated by the requirements for usable, useful and used systems (Grant, Moshyk, Kushniruk, & Moehr, 2003). If the effort needed to access policy resources at the clinician level is high, its usefulness will be diminished (Smith, 1996). A theoretical framework, the Normalisation Process Model, aims to identify factors that promote and inhibit the implementation of decision support technologies in routine practice (Elwyn, Légaré, van der Weijden, Edwards, & May, 2008).

There are programming challenges that may be difficult to overcome, including vendor agreements and information systems that do not fully fit with the purpose for which they were acquired. Collaboration is needed in the development and management of information resources to better ensure recognition of the differences in information structure and information needs based on varying philosophies of care and service as well as sites of care (Mohaghan & Cooke, 2004).

Protection of Health Information and Interprofessional Practice

A seamless integrated circle of care requires sharing of information across the settings of care, supported by legislation and policies at the local level. The regulatory and medico-legal barriers to interprofessional practice were identified (Lahey & Currie, 2005). Through collaboration between academics and policymakers the Regulated Health Professions Network Act was introduced (Lahey, 2012). Once passed, this legislation will enable interdisciplinary care and collaboration, and improve processes that may involve the different health professions involved in a patient's care (such as the investigation of a patient complaint for an adverse event, the sharing of competencies among the scopes of practice and the appeals process) (Wedlake, 2012). Policies that will be implemented need to be monitored to measure the impact of this Act.

At the macro level in Nova Scotia, the Personal Health Information Act, proclaimed on December 4, 2012 and effective June 1, 2013, "governs the collection, use, disclosure, retention, disposal and destruction of personal health information" (Nova Scotia Department of Health and Wellness, 2012). This act recognizes and supports the circle of care.

COACH, Canada's Health Informatics Association, publishes guidelines for the protection of health information. They state, "Health organizations must develop policies and procedures to protect the privacy, confidentiality, and security of personal health information under their control, to help mitigate the risk of unauthorized access, use or disclosure of such information, and to prevent against its loss or unnecessary destruction" (COACH, 2001). COACH publications are being continuously updated to align with changing legislation and new ways of delivering health information to patients and their caregivers.

Common Health Language

Policy committees need a standardized health glossary to achieve common policies and reduce the resource-intensive nature of administrative policy formulation. While there are medical dictionaries and online glossaries we are not aware of one that is specifically for health care professionals that melds written and spoken words and uses standardized health nomenclature that is grounded in a reference terminology. Access to a common language will support communication between professions, departments and health districts and help new health services staff. Use of a standardized health vocabulary is fundamental to both communications and information technology. It also enables semantic interoperability in ICT infrastructure (Paterson, 2008).

Generalization and Scaling Up of Policy

We need to pay systematic attention to how the benefits achieved in successful pilot or experimental projects can be expanded to serve more people more quickly and more equitably (Simmons & Shiffman, 2007). Policy is the articulation of a government program. Program development requires an interactive, iterative, and process-oriented approach to be sustainable.

High-level policy may be overly detailed and rigid, creating challenges for those who are tasked with implementing those policies locally. Such policies may require elements or processes that may not be available locally. However, these high level policies do have the advantage of authority and support. "In contrast, decentralized approaches allow local initiative, autonomy, spontaneity, mutual learning and problem-solving. Their obvious disadvantage is that they do not have the reach of central authorities, and often do not command sufficient influence or resources to ensure appropriate policy reform" (Simmons & Shiffman, 2007, p. 15).

Since electronic information sharing has such a broad reach, central principles concerning this have to be clear and universally applied. This is especially true of information that is used for overall program quality management where policies and practices have to be consistent across different settings.

Creating/Developing a Learning Organization

A learning organization is one that creates and uses administrative policy to best manage changing conditions, and is not rigidly bound by rules that emphasize standardization (Simmons & Shiffman, 2007). Administrators of health information systems are responsible for enabling clinical care. They need to ensure that clinical knowledge management systems are available for clinicians and their patients where and when needed.

Despite lots of education and public discussion about the concept of a multi-disciplinary team involvement in care, formal hospital-based medical records that are used as a basis for sharing information

with other clinicians may contain only information that has been approved by a central administrative committee that is primarily responsible for the legal status of the health record (Capital Health, 2011). Because of this approval process, there may be little information retained on the shared record from members of the team who are not hospital-based health practitioners. Examples include external (to the hospital) physiotherapists, family counselors, family caregivers and service staff who may have made important observations about the patient or been the most frequent confidant of the patient's wishes when in hospital. This affects not only the total care provided but also the richness of information available to researchers and others for quality improvement.

Shared Administrative Health Policy Development, Implementation, and Evaluation

There is an opportunity for efficiency if multiple organizations share policies. There must be a policy development framework with capacity, authority, and resourcing to achieve province-wide policy development, approval and distribution. In addition, policy readers need to be queried about their policy documentation needs and uses, and the barriers and challenges they encounter in finding and using institutional level policies.

Results arising from an evaluation of the effectiveness of program may identify policy issues. An independent evaluation of the Summary Care Records and HealthSpace programs in the UK (Greenhalgh, Hinder, Stramer, Bratan, & Russell, 2010) led to the closing of HealthSpace—a free, secure online health organizer—on December 14, 2012 and the destruction of all data in compliance with the Data Protection Act (NHS Connecting for Health, 2012). The findings raised questions about how this eHealth program in England was developed and approved at the policy level. The evaluation revealed that the benefits anticipated by policy makers were not achieved.

HEALTH SERVICE MANAGERS, ADMINISTRATIVE POLICY, AND DECISION MAKING

Health services have been described as the most complex of organizations to manage (Glouberman & Mintzberg, 2001). Elsewhere they are referred to as "high velocity" environments "in which there is rapid and discontinuous change … such that information is often inaccurate, unavailable, or obsolete" (Stephanovich & Uhrig, 1999, p. 198). Within this environment, health service managers are accountable for health service quality, resource use, employee effectiveness and wellbeing, and workplace safety and productivity.

Little research directly related to administrative health policy development has been identified. A mixed-methods study of 116 Australian health administrators' policy-related decision making practices used interviews and surveys to explore resource allocation decision situations (Baghbanian, Hughes, Kebriaei, & Khavarpour, 2012). Conclusions included that policy makers were "enlightened by" research that reached them indirectly. Managers made policy decisions by involving others with knowledge of the situation rather than by following formal procedures and reading primary research or systematic reviews. Decisions were characterized by ambiguity and complexity, short deadlines, incomplete information and significant unknowns. A UK study that used 21 interviews, document analysis and embedded research to assess understanding about national (macro level) policy translated to programs (meso level) and

implemented locally (micro level) attributed differences to local contexts and different approaches to knowledge translation and concluded that a common understanding of purpose and objectives contributed to success (Caldwell & Mays, 2012).

Research on what health service managers actually do includes ten workplace studies of their information and decision making behavior. Five studies of health service managers and their workplace information access and use, each conducted in a different country and with a slightly different focus, found similar challenges related to information access and use (Head, 1996; Kovner & Rundall, 2006; Mbananga & Sekokotla, 2002; Moahi, 2000; Niedźwiedzka, 2003) despite difference in the wealth of the country (G8 or not), degree of computerization (desktop access to databases and the Internet, or not), single hospital or multi-site health service, and health service funding (whether public or private). These studies observed the importance of internal or local information to healthcare services. An additional five other studies of health service managers in their workplaces shared the finding that much of their work time was spent in meetings (Arman, Dellve, Wikström, & Törnström, 2009; Baghbanian, Hughes, Kebriaei, & Khavarpour, 2012; MacDonald, 2011; Moss, 2000; Tengelin, Arman, Wikström, & Delive, 2011).

The remaining literature on health service managers has tended to focus either on what they should do (Gray, 2009; Innvaer, Vist, Trommald, & Oxman, 2002; Innvær, 2009) or why they do not do what they should do (Kadane, 2005; Willis, Mitton, Gordon, & Best, 2012).

We do not know the cost to a health service organization of developing a single administrative policy or the potential return on investment of shared administrative policy development. OP3 members individually estimated the number of employees involved and the time needed to complete each task in the policy process model used by OP3. When tasks were totaled, the cost of developing a policy ranged from $10,000 to $200,000 with legal advice a factor contributing to higher policy development costs.

No research has been identified that explores how administrative policy decisions are made, how administrative policies are used or who uses them, whether policy development practices might be improved, or what the costs and benefits of shared policies are. Further research is needed to know whether problems solved and decisions made at health service managers meetings are shared within the organization and how they are shared, whether informally (either orally or through email) or formally (as administrative policy to support structured decision making).

ADMINISTRATIVE HEALTH POLICY IN CANADA

Through the 1980s and 1990s, Canadian hospitals were guided through policy and procedure manual development by Paula Cryderman (Cryderman, 1987). By the end of the 1990s, Cryderman recommended an overhaul to hospital policy manuals, citing forces of change that rendered manuals obsolete (Cryderman, 1999).

The Canadian Policy and Procedure Network (CPPN) has served since 2004 as "an informal forum for health care professionals to share and discuss policy and procedure topics for the improvement of health care" (Canadian Policy and Procedure Network, 2010). The CPPN is a moderated Yahoo Group with over 200 members. Members post an average 2,500 policy questions and requests for examples of policy and procedure documents per year.

The Canadian Association for Health Services and Policy Research (CAHSPR) is Canada's largest health services and policy research association. CAHSPR holds an annual conference and uses social

media tools, such as Twitter, to build a community working towards evidence-based health care and health policy. "CAHSPR's mission is to improve health and health care by advancing the quality, relevance and application of research on health services and health policy" (Canadian Association for Health Services and Policy Research, 2012). Annual conferences feature policy forums and panel discussions which encourage true dialogue and debate. Citizen participation is important to a democracy and to the development of health policies that reflect the type of society that citizens want.

Accreditations Canada has performance indicators to measure the degree to which a health care facility delivers health care services according to criteria. Personnel in charge of administrative health policy are often the ones who participate in the assessment, which makes visible to the reviewers how well a facility abides by its health policies. As part of the dissemination of knowledge, Accreditations Canada developed a searchable Leading Practices Database to recognize innovative solutions to improving the quality of healthcare services delivery (Accreditations Canada, 2012).

ADMINISTRATIVE HEALTH POLICY EXPERIENCE IN NOVA SCOTIA, 2007-2012

In 2005, recognizing the resource-intensive complexity of policy development within their DHAs, Chief Executive Officers (CEOs) of Nova Scotia's nine DHAs and the Izaak Walton Killam Health Centre (IWK, pediatric and obstetric health centre for the Maritime Provinces) commissioned a feasibility study of shared policy development. The study identified fifteen opportunities for efficiencies with shared policies (Table 1).

In response to the study, the DHA/IWK CEOs established a working group in 2007, initially with one representative from each organization. The group expanded to include representatives from the Nova Scotia Department of Health and Wellness Policy and Planning Branch, and from the Health Association of Nova Scotia Policy, Planning and Decision Support Unit. All members of this group, known as OP3, have full time responsibilities in their own organization. Two guides, Policy Development, Implementation and Evaluation (Capital Health, 2012) and Style Guide, provide standard approaches to writing and formatting policy documents (OP3: One Province, One Process, One Policy, 2011).

Table 1. Opportunities for efficiency for NS DHAs/IWK in shared policy development

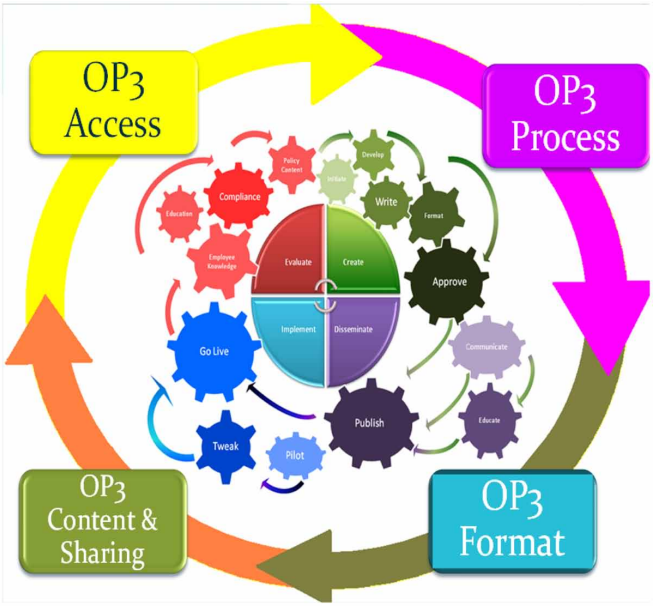
Coordinated Policy Processes	Coordinated Policy Structures	Coordinated Policy Skills and Competencies	Coordinated Policy Technology/ Enablers
1. Coordinated issue identification. 2. Centralized research support. 3. Centralized policy development. 4. Centralized communication and education content development. 5. Coordinated archiving and storage. 6. Coordinated compliance monitoring. 7. Provincial coordination of practice guidelines and procedures.	8. Formalize the policy 'community of interest' or network. 9. Leverage existing provincial committees. 10. Create new policy development committees.	11. Provincial Policy researcher/ coordinator.	12. Common policy templates and formats. 13. Collaboration tools. 14. Document management tools. 15. Access to Common templates.

By the fall of 2012, the group accomplished five of the fifteen opportunities for efficiency (numbers 5, 8. 12, 13, and 14 in Table 1) including coordinated archiving and storage in the form of a Web-based platform for shared policy management (http://policy.nshealth.ca/). In 2012, although policy manuals for most DHAs remain incomplete, an average of 500 policies per DHA is available on the site. Some DHAs have over 1,000 policies on the OP3 site.

In 2011, to inform strategic planning, OP3 members began considering evaluation of both group and policy process. A review of meeting minutes identified 45 tasks in the policy process that might be evaluated (Appendix A). To help explain the administrative policy development process to a DHA Policy Committee willing to develop a pilot evaluation survey, these 45 tasks were grouped under 15 main headings, and arranged graphically as cogs in a policy process cycle (Figure 1).

In an effort to build a business case for a single office in Nova Scotia, OP3 members are considering how to best estimate or track the cost of developing a single policy in one DHA. Research is required to accurately calculate this cost. A suggested approach is to ask OP3 members to consider an estimated cost for a sample of policies in each DHA. By considering each of the 45 tasks listed in Appendix A, OP3 members could estimate or track: 1) whether the task is routine in a DHA, 1a) if it is not routine, whether the member believes the task should be routine or 1b) if the task is routine, the number of employees typically engaged in the task, and 2) the average length of time required of a single employee engaged in the task.

Figure 1. Administrative policy process: graphic representation of steps in the OP3 shared policy development process (©South Shore Health Authority and used with permission)



DISCUSSION

Using the experience of one author with the OP3 working group process described above, we identified four particularly challenging areas that could benefit from an increased role of health informatics in health policy and management. We also discuss two additional areas where there is a relationship between health informatics research and administrative policy development at the health services level.

The Research Practice Gap

Managers need research to provide solutions to their problems rather than explanations of why things happen or instruction telling them what not to do. This "relevance gap" where either the research subjects or focus are not relevant to managers' needs has been suggested as the reason why managers make little use of research (Davies, 2006). Labadie uses the metaphor of a burning house to show how different the cultures are: "Decision makers put out fires, and researchers want to let the fire burn to understand how it spreads" (Labadie, 2005).

The research practice gap with respect to health policy generally, and in health informatics research specifically, can be expressed by the lack of administrative health policy research in several areas that impede OP3 working group progress.

A Variety of Sources for Rules

The relationship between provincial and federal legislation related to health, public health policy, clinical health policy, administrative health policy, professional standards, clinical competencies and practice guidelines is not clear. Typically various document types exist to address a subject, each created independently without reference to the others, each with their own sets of definitions and references. Administrative policy, intended to give clear policy guidance to practicing health professionals within a particular setting, must address local context while taking into consideration the full array of other influencing policies, practice guidelines and practice standards. This can leave health professionals and administrators confused so that they must rely on their own best judgment and hope that it is consistent with the purposes of the organization, congruent with current research and compliant with legislation and other rules.

Policy Contributor and Policy Approver

In the experience of the authors, the difference between the roles of these two stakeholder groups is not always clear and there is no system to support effective management of contributions and approvals. Historically, in single site health service organizations, tracking contributions during policy development has been accomplished through a printed one page tracking sheet. This documentation is handled separately from the approval process, with approvals managed through signatures on the original copies of printed policies. Multi-site, multi-organizational shared policy development requires an automated system or mechanism to track contributions from various sites and groups. There is a need to clarify for each policy the level of approval necessary for implementation in each organization and track whether that approval has been granted.

Shared Health Policy Language

A review of the 400 publicly available policies available on the OP3 policy site in April 2011 identified >1,000 terms defined within the policies. Some of these terms had as many as 18 different definitions created independently by the policy writer with inconsistencies between and within departments and DHAs. A study by a graduate student completed in 2012 identified terms defined as clinical, technical, administrative and general (Phinney, MacDonald, & Spiteri, 2012). The study concluded that of 26 potential policy languages examined, the best source of definitions for the variety of administrative health policy terms in Nova Scotia administrative health policies on the OP3 site was the Unified Medical Language System (U.S. National Library of Medicine, 2012). The best way to introduce and implement a standard language has not been identified.

A Critical Conflict Inherent in Health Informatics Policy: Privacy of Health Information

Health informatics policy implicitly affects two core values within healthcare delivery. One is the practice of patient-centered, collaborative healthcare through all parts and among all providers within the healthcare system. The other is protecting the privacy of patient information. Health informatics provides the tools, mechanisms and processes to share critical patient and patient-care information among the full range of healthcare providers and others critical to care and well-being of the patient. It also provides ready access to clinical research for evidence-based practice. Ideally, this information is also shared with the patient (or patient proxy) so that the patient is the driver of his/her own health care. Appropriately applied, health informatics methods reduce the risk of "private" information becoming known to others outside of the care network.

Risk management is an important consideration. The risk of unwanted publicity or legal action against care providers and health organizations on the basis of information available must be managed through health informatics processes based on health informatics policy.

The Role of Administrative Health Policy in Education and Innovation

Another core value inherent in health care is that of innovation: continuous exploration into the best ways to deliver healthcare through complex systems of organizations and professionals. A sound health informatics policy encourages exploration and innovation by providing a statement of principles/values that encourages both exploration and its careful management. Such a policy also includes guidance and processes on introduction and integration of innovations, in care and professional practice, into the work of the organization and its associated care providers. Current areas of administrative innovation in this area are the use and dissemination of electronic health records, both within the organization and among related community healthcare providers.

Along with innovation (the introduction of new concepts and practices) comes the need for continuous learning among those who must change their practice and processes. Sound administrative policy related to health informatics and health information systems provides the framework and guidelines for what needs to be learned. Part of the administrative practice would then be to collaboratively learn new or varying practice principles and patterns. By learning together, administrative and clinical professionals

discover the areas of potential challenge. By working through those challenges together in a continuous learning environment, the result is improved practice and health outcomes. Health services will be enabled by health information systems based on policy at all three levels: public, clinical and administrative.

CONCLUSION

The introduction and use of health information systems throughout health organizations and among members of multi-site organizations is still considered innovative. Health service organizations experience continuing change in practice and administration. Organization-wide innovations often require lengthy periods of time and iterative processes to accomplish (Rogers, 1983). Cost-effective shared administrative policy development to provide clear overall guidance for health services and for health informatics solutions designed to support health services is essential.

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KEY TERMS AND DEFINITIONS

Data Quality Framework: Aggregation of data from individual patient records to fulfill data requirements for measuring patient and population health and health system performance.

eHealth: Health care practice which is supported by electronic information and communication systems.

Health Data Standards: Standards developed by international standards organizations and adopted or adapted by Canada's Standards Collaborative to determine how health data is classified or grouped, and how it is encoded in machine-readable representation for electronic manipulation.

Health Informatics Policies: Explicit statements directing how to address issues that arise with the introduction of information technology into the health system, including topics such as ethics; information security and privacy; interoperability; health communication; social implications of computing; and, quality, risk and patient safety.

Health Organization Models: Health organization models of care delivery vary based on the philosophies of care and service as well as sites of care and use of multi-disciplinary care teams.

Health Policy Informatics: A subdiscipline of health informatics that addresses challenges experienced by health service managers and other policymakers and problems that arise from the multidimensional nature of information used for policy creation, dissemination, implementation and evaluation.

Knowledge Management: Aims to leverage the intellectual capital held in the skills and expertise of personnel so that the knowledge that is critical to them is made available in the most effective manner to those people who need it so that it can add value as a normal part of work.

Policy Implementation: Policy management across the lifecycle including release, communication, translation, compliance monitoring, effects evaluation and revision.

Policy Monitoring: Feedback loop that allows you to monitor for policy effects.

Shared Health Policy Development: Inter-organizational policy development, ideally using a framework that addresses capacity, authority and resourcing to achieve policy development, approval and distribution at the meso and macro levels.

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APPENDIX

Table 2. Tasks in the Administrative Policy Process identified by the OP3 Working Group

Quadrant	Policy Process (Cog)	Task		Definition
Create	Initiate	1.	Identify Issue	Recognize policy need
Create	Initiate	2.	Consult	Consult with several colleagues to see what they think of an issue
Create	Initiate	3.	Compare Situations	Compare 2-3 similar incidents and decide whether a policy is needed
Create	Initiate	4.	Respond	Respond to provincial policy or legislation with DHA policy
Create	Initiate	5.	Acknowledge	Recognize policy gap and decide to create a policy
Create	Initiate	6.	Set Policy Level	Decide where admin or other type of policy is needed
Create	Initiate	7.	Stakeholders	Identify stakeholders & contributors & approvers, including legal, ethics
Create	Initiate	8.	Plan For Education	Decide whether education will be required
Create	Initiate	9.	Plan For Monitoring	Decide whether monitoring will be required
Create	Initiate	10.	Plan For Evaluation	Decide whether evaluation will be required
Create	Initiate	11.	Plan Timing	Decide when policy should go live (ideally)
Create	Develop	12.	Literature Search	Search for current research evidence and best practice
Create	Develop	13.	Environmental Scan	See who is doing what in similar organizations
Create	Develop	14.	FEMA (Failure Mode Effect Analysis)	Consider effect of policy failures and design policy for maximum success
Create	Develop	15.	Appraise	Appraise, synthesize and integrate information gathered
Create	Develop	16.	Review Rules	Ensure congruency with legislation and provincial health policy
Create	Develop	17.	SBAR	Create SBAR to communicate policy need
Create	Write	18.	Draft	Create first draft
Create	Write	19.	Define	Define less familiar terms
Create	Write	20.	Revise	In plain language and appropriate writing style
Create	Write	21.	Reference	Support text with references and reference list
Create	Write	22.	Procedure	Identify and draft associated procedures
Create	Write	23.	Forms	Identify form requirements and locate or create forms
Create	Write	24.	Appendix	Create required appendices
Create	Format	25.	Algorithms	Create decision tree
Create	Format	26.	Template	Format in appropriate template
Create	Format	27.	Toc	Add table of contents
Create	Write	28.	Input	Seek stakeholder input
Create	Write	29.	Revise	Synthesize, appraise and integrate stakeholder format
Create	Write	30.	Legal/ethical	Seek and integrate input from legal and ethical experts

continued on following page

Table 2. Continued

Quadrant	Policy Process (Cog)	Task		Definition
Create	Write	31.	Review	Seek stakeholder input on revisions
Create	Write	32.	Director	Seek input & approval from org unit director
Create	Write	33.	Committee	Seek input and approval from DHA policy committee
Create	Approve	34.	Approve	Have DHA authority approve policy
Disseminate	Communicate	35.	Communicate	Design and implement communication plan
Disseminate	Educate	36.	Educate	Design and deliver education
Disseminate	Publish	37.	Publish	Make policy available on op3 site
Implement	Pilot	38.	Pilot	Test policy in limited setting for limited period
Implement	Tweak	39.	Tweak	Revise pilot following user experience
Implement	Go Live	40.	Go Live	Release policy effective DHA wide
Evaluate	Evaluate	41.	Evaluate Employee Knowledge	Test to determine employee awareness of policy
Evaluate	Evaluate	42.	Evaluate Policy Content	Survey to determine if content meets needs
Evaluate	Evaluate	43.	Evaluate Policy Education	Survey to determine if education was effective
Evaluate	Evaluate	44.	Evaluate Policy Compliance	Monitor to establish DHA complies with policy
Evaluate	Evaluate	45.	Evaluate Policy Outcomes	Determine whether policy meets need

Chapter 20
Human Resources for Mental Health in Low and Middle Income Countries: Evidence From Bangladesh

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ABSTRACT

Mental disorders are a major public health challenge globally, contributing to 40% of the global burden of disease. Nevertheless, it remains highly neglected by health planners and policy makers, particularly in low and middle income countries (LMIC). Bangladesh, one of the low-income countries, suffers from a severe shortage of appropriately trained and an adequate number of human resources to provide mental health care. The authors reviewed available evidence on the dynamics of mental health services in LMIC like Bangladesh, with a view to help develop appropriate policies on human resources. This chapter critically examines the current situation of human resources for mental health in Bangladesh, and explores ways to further strengthen human resources so as to enhance mental health services in the country.

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INTRODUCTION

Non-communicable diseases including mental disorders are the leading cause of morbidity and mortality globally (S. Islam et al., 2014). The Global Burden of Disease study reported that between 1990 and 2010, the burden of mental and substance use disorders increased by 37·6% (Whiteford et al., 2013). In 2010, mental health and substance use disorders were the leading cause of years lived with disability (YLDs) worldwide, posing a striking and growing challenge to health systems in both developed and developing regions. The World Health Organization (WHO) estimated that mental health conditions contribute to 14% of all of the world's premature deaths (Bruckner et al., 2011). Mental health disorders impose huge financial burdens on people, families, health systems, and nations. Yet, mental health remains neglected in global health priorities and donor agenda, and seriously compromises access to care for people who need it the most.

A great majority of the people with mental health disorders live in low-and-middle income countries (LMIC) where the health systems are inadequate to provide the minimal necessary services. More than two-thirds of people with serious mental disorders in LMICs do not receive treatment and are often undiagnosed (Demyttenaere et al., 2004). While the mental health issues are escalating in developing countries, the growing shortage of trained health care providers is adversely affecting the quality of mental health of the general population. The *World Health Report 2006* drew global attention to the shortage of health workers in LMICs (WHO, 2006). Many LMIC face a serious crisis of adequately trained human resources for mental health (Kakuma et al., 2011).

Bangladesh, one of the developing countries, suffers from a severe shortage of mental health workers. The lack of reliable data on the prevalence of mental illness and the resultant burden of morbidity in Bangladesh makes it difficult to develop and introduce effective preventative measures and appropriate health care interventions (Islam & Tabassum, 2015). Since mental well-being is clearly associated with physical well-being (Saxena, Thornicroft, Knapp, & Whiteford, 2007), it is critically important to assess the mental health and well-being of the people of Bangladesh. It should be noted that emphasis is being placed on the issue of human resources for health in LMIC with special focus on mental health. Clearly growing evidence from these countries strongly suggests the need for the development of effective strategies for human resources in mental health. Bangladesh is no exception in this regard.

The authors reviewed the available evidence on mental health services with a view to better understand the need for human resources for mental health in LMIC. Evidence gained from developing countries could be used to inform the development of appropriate policies in Bangladesh. This chapter examines the current situation of human resources for mental health in Bangladesh, and explores the potential solutions to improving mental health services in Bangladesh with respect to human resources for mental health care.

BACKGROUND

According to the WHO (1948, p. 1), "health is a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity". Mental health is an integral part of human health and well-being. In 2005, the WHO endorsed the phrase "no health without mental health" (Prince et al., 2007). The WHO (World Health Organization, 2004) classification of mental and behavioral disorders include:

- Organic, including symptomatic, mental disorders (dementia, delirium, and brain injury).
- Mental and behavioral disorders due to use of psychoactive substances (alcohol-use and substance-use syndromes, including harmful use, dependence, and withdrawal).
- Schizophrenia, and schizotypal and delusional disorders.
- Mood (affective) disorders (mania, hypomania, bipolar affective disorder, and depressive episodes).
- Neurotic, stress-related, and somatoform disorders (phobic anxiety disorder, panic disorder, generalized anxiety disorder, obsessive-compulsive disorder, post-traumatic stress disorder, adjustment disorder, dissociative disorder, and somatization disorder).
- Behavioral syndromes associated with physiological disturbances and physical factors (eating disorders, sleep disorders, sexual dysfunction).
- Disorders of adult personality and behavior.
- Mental retardation.
- Disorders of psychological development.
- Behavioral and emotional disorders with onset usually in childhood and adolescence (hyperkinetic disorders, emotional disorders, and conduct disorders).
- Unspecified mental disorders.

The World Mental Health surveys, which includes nationally or regionally representative surveys in 28 countries, reflecting all regions of the world, demonstrated that mental disorders are highly prevalent throughout the world; the lifetime prevalence figures ranged from 12.0% to 47.4%, with a median of 26% (Kessler et al., 2009). Mental health and neuropsychiatric conditions contributed to 28% of the total global burden of disability-adjusted life-years worldwide in 2005 (Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015). There is a complex web of interrelated issues linking mental disorders with physical ailments making them both important public health concerns (Prince et al., 2007). It is disconcerting to note that about half of all lifetime mental disorders start by the mid-teens, and three-quarters by the mid-twenties (Kessler et al., 2007).

The burden of neuropsychiatric disorders varies across regions of the world: disability-adjusted life-years and years lived with disability are highest in high-income countries and lowest in low-income countries (Okpaku, 2014). More than 85% of the world's population lives in the 153 countries classified as LMIC, according to the World Bank criteria (Jacob et al., 2007). Scarcity of mental health resources, inequity in resource distribution across service sectors, as well as geographical regions (rural and urban), and the inefficiency in use of such resources plague most LMIC (Saxena et al., 2007). However, there is growing evidence that many of these countries do not have effective interventions for the treatment and prevention of mental disorders (Prince et al., 2007). Major deficits in effective provision of health care services in LMIC include a scarcity of appropriately trained personnel and a lack of proper training facilities. Moreover, there is a need to assess innovative, scalable models of care delivery, and to ensure there is a strong political will to support policy, research, training, and infrastructure development as explicit priorities at the national level (Becker & Kleinman, 2013).

In many regions of the world, mental disorders often remain undiagnosed and untreated. In addition, those who receive treatment have often delayed their treatment for years (Wang et al., 2007). Reasons for the delay in treatment include failing to seek help because the problem is not acknowledged, perceiving treatment will not be effective, believing the problem will go away by itself, and desiring to deal with the problem without outside help (Okpaku, 2014). In addition, a lack of knowledge about mental disorders and stigma remain major barriers to care. Factors that are direct barriers to care also preclude

treatment, including financial considerations and issues of accessibility, as well as the limited or lack of availability of services in many countries (Kohn, Saxena, Levav, & Saraceno, 2004; Saldivia, Vicente, Kohn, Rioseco, & Torres, 2004). As a result, mental health imposes huge financial burdens on individuals, societies, and nations.

As a low income country, Bangladesh has made significant progress in several health indicators over recent decades including reducing maternal and child deaths, increasing immunization coverage, and improving the overall life-expectancy at birth. However, the country still faces several health challenges, including increasing burden of several chronic diseases like diabetes (Biswas, Islam, Rawal, & Islam, 2016; Sal-sabil, Islam, & Islam, 2016), hypertension (Islam, Mainuddin et al., 2015), cardiovascular diseases (Karim et al., 2015), stroke, respiratory diseases, and cancer (Islam & Niessen, 2014; Islam et al., 2014c). The health system remains inadequate for the provision of essential services for chronic diseases and mental health. Bangladesh has 536 public hospitals with 37,387 beds that deliver inpatient care services for a population of 160 million (Islam & Biswas, 2014). Nevertheless, there is only one 500-bedded mental hospital in Dhaka, the capital city of the country for inpatient care services. On the other hand, there are only a few tertiary-level psychiatric care facilities which are mostly concentrated in the major metropolitan areas. Although Dhaka has five times more psychiatric beds than the rest of the country, few publicly funded facilities are available, including medicines, clinical facilities, and emergency care services for people with mental illness. At the same time, there is a serious lack of mental health rehabilitation and community support (Islam, Rahman, Aleem, & Islam, 2016).

According to WHO, more than 15 million people are suffering from severe mental disorders in Bangladesh (Hosman, Jané Llopis, & Saxena, 2004). Even though a significant decline was observed in the rate of mental disorders in Bangladesh between 1974 (31.4%) and 2005 (16.1%), it was still shockingly high in 2005. The first WHO national survey on mental health conducted in Bangladesh in 2003-2005 demonstrated that 16.1% of the population had some form of mental disorder, and the prevalence of mental disorders was higher among women (19%) than men (12.9%) (WHO, 2006). Additionally, a community-based survey conducted in 2009 in Bangladesh found the prevalence of mental disorders among children was 18.4% (Gausia, Fisher, Ali, & Oosthuizen, 2009). Previous studies in Bangladesh have also reported a high prevalence of depression in patients with diabetes or post stroke (Islam et al., 2016; Islam, Ferrari, Seissler, Niessen, & Lechner, 2015; S. Islam, Rawal, & Niessen, 2015). Mental illnesses are predominantly deemed as the result of being possessed by malicious spirits. The victims of mental illnesses are often neglected, abused, or their care delayed if it takes place at all in Bangladesh (Adams et al., 2014; S. Islam et al., 2015d).

HUMAN RESOURCES FOR MENTAL HEALTH IN BANGLADESH

Global Human Resources for Health

Human resources are the main pillars of the health system. The WHO Global Health Workforce Alliance endorsed that there is “no health without a workforce” (Campbell et al., 2013). Data on human resources for health are not available for all countries. The WHO Global Health Observatory reports workforce data for 186 countries. But 53% of these countries have fewer than 7 annual data points on midwives, nurses, and physicians across the past 20 years. Furthermore, of the 57 countries identified in 2006 with low human resources for health in density and low service coverage, 17 of these countries

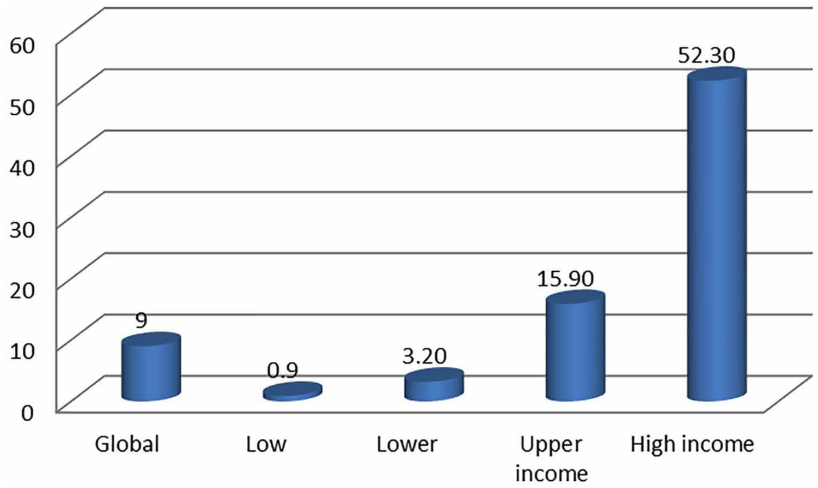
have no data point in the past five years (Campbell et al., 2013). The report showed that 118 countries (63%) fall below the threshold of 59.4 skilled health professionals per 10,000 population. Two-thirds of the world's countries may therefore face considerable challenges in addressing deficits below this indicative threshold. Reports of the Second Global Forum on Human Resources for Health, Bangkok, Thailand in 2011 found that the supply and availability of qualified health workers in many countries remained insufficient to deliver an effective package of essential health services, and ensure poor and marginalized people have equitable access to the health workforce and to health services (Global Health Workforce Alliance, 2011).

Current State of Global Human Resources for Mental Health

A total of 130 countries, representing two-thirds of all the WHO member states, were able to provide at least partial estimates of known mental health workers in their country. The median number of mental health workers per 100,000 population are shown for different WHO regions and for countries at different income levels in Figure 1. The global median is 9 per 100,000 population, or less than one mental health worker for every 10,000 people (WHO, 2015). However, based on these data, rates are projected to vary from below 1 per 100,000 population in low-income countries to over 50 in high-income countries.

The *Mental Health Atlas 2014* provides information on different staff categories across countries. Results indicate the proportion of workers in different staff categories is quite stable across countries and different income levels, with nurses comprising the single largest group of workers (40% to 60%). However, the absolute number of workers per 100,000 population varies enormously; for example, there were 6.6 psychiatrists per 100,000 population in the sampled high-income countries, compared to less than 0.5 per 100,000 population in LMIC. Similarly, there are over 30 nurses working in mental health per 100,000 population in high-income country settings compared to 0.4 in low-income countries, 2.5 in LMIC, and 7.1 in upper-middle income countries. Across all WHO regions, a large majority of mental health workers surveyed by the *Mental Health Atlas 2014* survey are working in inpatient and day care services (82% globally).

Figure 1. Mental health workforce per 100,000 populations, by World Bank income group
Source: WHO, 2015



There has been a slight decline (of 6%) in the overall reported number of psychiatrists between 2011 and 2014, as shown in Table 1. This finding may reflect under-reporting in the 2014 survey of psychiatrists working in private practice (particular emphasis had been given to this in the 2011 survey). In the South-East Asian and African Regions, the reported number of psychiatrists has increased by more than 25% (albeit from a very low baseline rate in 2011) (WHO, 2014). However, training programmes for psychiatrists are present in only 55% of low-income countries, 69% of LMIC, and 60% of upper middle income countries (World Psychiatric Association & WHO, 2005). The median number of nurses working in mental health globally has increased by 37%, with particularly notable increases in the American (63%) and Eastern Mediterranean Regions (46%) (WHO, 2015). The positive change in the number of nurses working in mental health is greatest in low-income countries and least in high-income countries. However, the absolute number of nurses working in mental health in high-income countries is still a lot higher than that in lower income countries (WHO, 2015).

Hospital Beds and Admissions

Globally, there was a slight decrease of 5% in the number of mental hospitals between 2011 and 2014. There has been a more significant decrease in the number of mental hospital beds, which has dropped by nearly 30% compared to 2011 (WHO, 2014). In all WHO regions, there was a decline in the number of beds, particularly in the region of the Americas (a 45% decrease) (WHO, 2014). When countries were grouped according to income level, all except the lower middle-income category showed a reduction in both the number of hospitals and number of mental hospital beds. At the global level, the number of beds available in psychiatric wards in general hospitals has increased significantly by 60% between 2011 and 2014 (WHO, 2015).

Despite the global decrease in the number of beds, as shown in Table 2 there was an increase of over 20% in the median rate of admission to mental hospitals globally, indicative of a higher patient turnover rate. The trends across WHO regions are mixed; for example, the Western Pacific Region shows a decline of more than 50%, while the Eastern Mediterranean and South-East Asian Regions show an increase of 25%. In high-income countries there was a 19% decline in admission rates to mental hospitals while there was a slight increase (of 2%) in low-income countries (WHO, 2014).

Table 1. Change in number of psychiatrists and nurses working in mental health from 2011 to 2014

	Psychiatrists (Median Rate Per 100,000 Population)				**Nurses (Median Rate Per 100,000 Population)**			
	N	**2014**	**2011**	**Change**	*N*	**2014**	**2011**	**Change**
Global	118	0.93	0.99	−6%	106	5.31	3.89	37%
Income								
Low	24	0.05	0.05	−2%	23	0.36	0.26	41%
Lower-middle	33	0.38	0.33	15%	30	2.73	2.26	20%
Upper-middle	34	1.39	1.61	−13%	32	8.2	7.09	16%
High	27	7.47	8.18	−8%	21	33.24	30.76	8%

Source: WHO, 2015

Table 2. Change in admissions to mental hospital and psychiatric wards in general hospitals

		Mental Hospital Admission (Median Rate Per 100,000 Population)			General Hospital Admission (Median Rate Per 100,000 Population)			
	N	2014	2011	Change	*N*	2014	2011	Change
Global	94	41.15	33.75	22%	94	43.79	23.74	84%
Income								
Low	16	9.36	9.19	2%	10	3.62	4.57	−21%
Lower-middle	20	15.98	19.36	−17%	14	5.97	4.74	26%
Upper-middle	27	41.89	55.7	−25%	16	50.86	27.36	86%
High	31	128.32	159.11	−19%	23	121.89	164.98	−26%

Source: WHO, 2014

Human Resources for Health in Bangladesh

Bangladesh is one of the countries with a stark shortage of health workers, especially in rural areas. A nationally representative survey conducted in 2007 reported that there were approximately 5 physicians and 2 nurses per 10 000 population, the ratio of nurse to physician being only 0.4 (Ahmed, Hossain, RajaChowdhury, & Bhuiya, 2011). This ratio is far below the WHO minimum recommended levels. The distribution of human resources in Bangladesh varied substantially among different divisions, with a gross imbalance favoring urban areas. There were around 12 unqualified village doctors and 11 sales people at local medicine retail shops per 10,000 population. The number of community health workers (CHWs) from the non-governmental organization (NGO) sector was almost double compared to the government sector and an overwhelming number of traditional birth attendants with no medical training. The village doctors (predominantly males) and the CHWs (predominantly females) were mainly concentrated in rural areas, while the paraprofessionals were concentrated in urban areas. The number of faith/traditional healers, homeopaths (qualified and non-qualified) and basic care providers are still high in rural and hard to reach areas, and form the first level of contact for several diseases including mental health (S. Islam & Moreau, 2009).

In summary, Bangladesh is suffering from a severe human resources for health crisis in terms of a shortage of qualified providers, has an inappropriate skills-mix, and inequity in distribution, compared to international recommendations which demands priority action from policy makers (Ahmed et al., 2011).

Human Resources for Mental Health in Bangladesh

Like many other developing countries, Bangladesh is also faced with a range of daunting and interlocking mental health issues, especially an acute shortage of skilled and qualified human resources for mental health. There are only 0.49 skilled human resources and 0.07 psychiatrists per 100,000 population (WHO, 2011). These figures clearly highlight the crisis of human resources for mental health in the country. The *Mental Health Atlas 2011* (WHO, 2011) reports existing categories of human resources for mental health per 100,000 population in Bangladesh as follows:

- Medical doctors (not specialized in psychiatry) 0.19.

- Nurses 0.20.
- Psychologists 0.01.
- Social workers 0.002.
- Occupational therapists 0.002.
- Other mental health workers 0.04.

The human resource situation in Bangladesh, as noted earlier, remains critical. Table 3 shows the health facilities for available mental health patients. It should be noted that a total of only 47 psychiatrists are actively involved in service provision – 10 in outpatient facilities, 33 in community-based inpatient psychiatric units, and 4 in mental hospitals. On the other hand, 70 medical doctors (general practitioners) work in outpatient facilities; 140 in community-based psychiatric inpatient units, and 15 in mental hospitals. As for nurses, 21 work in outpatient facilities, 220 in community-based psychiatric inpatient units, and 140 in mental hospitals. Furthermore, four psychosocial professionals are engaged in outpatient services; three in community-based psychiatric inpatient units, and three in mental hospitals (A. Islam & Biswas, 2015).

Table 4 shows the number of human resources for mental health in Bangladesh. Most of the psychiatrists (54%) deliver services in public or private sector mental health facilities, while 46% of practitioners work for NGOs or are involved in private practice (Barkat & Maksud, 2003). Moreover, 62% and 26% of psychosocial professionals work for government funded mental health facilities and NGOs, or in private practice respectively. The remaining 12% of psychosocial professionals are involved in public or private sector mental health practice. Additionally, the psychiatrists practicing in government hospitals or facilities are permitted to work simultaneously in the private sector, which triggers the culture of dual practice in the mental health care sector (A. Islam & Biswas, 2015).

Since the 1990s, growing emphasis has been placed on health promotion and preventative services in Bangladesh by the health sector. Nevertheless, a large number of people in rural areas have little access to healthcare services compared to their urban counterparts (A. Islam & Biswas, 2014). There are 0.04 psychiatrists per bed in community-based inpatient psychiatric units, whereas in hospitals the psychiatrist-bed ratio is only 0.01. However, nurses are almost evenly distributed between the community-based inpatient psychiatric units (0.27 per bed) and mental hospitals (0.028 per bed) (Islam & Biswas,

Table 3. Health facilities available for mental health patients in Bangladesh

	Total Number of Facilities/ Beds	**Rate Per 100,000 Population**	**Number of Facilities/Beds Reserved for Children and Adolescents Only**	**Rate Per 100,000 Population**
Mental health outpatient facilities	60	0.04	2	0.001
Day treatment facilities	0	0.0	NA	NA
Psychiatric beds in general hospitals	900	0.55	20	0.01
Community residential facilities	11	0.01	0	NA
Beds/places in community residential facilities	1283	0.78	936	0.57
Mental hospitals	1	0.0001	0	0
Beds in mental hospitals	500	0.3	0	0

Source: WHO, 2011

Table 4. The number of human resources for mental health in Bangladesh

	Health Professionals Working in the Mental Health Sector Rate Per 100,000	Training of Health Professions in Educational Institutions Rate Per 100,000
Psychiatrists	0.07	0.03
Medical doctors, not specialized in psychiatry	0.19	3.04
Nurses	0.20	0.25
Psychologists	0.01	0.02
Social workers	0.002	0.12
Occupational therapists	0.002	0.18
Other health workers	0.04	NA

Source: WHO, 2011

2015). The urban-rural disparity is most pronounced in the incidence of mental illness with rural areas accounting for the largest number of cases as more than 70% of the population live in rural Bangladesh. Needless to say, human resources for mental health is disproportionately distributed across the country with rural areas facing a critical shortage (Joint Learning Initiative, 2004; WHO, 2004).

Key Challenges in Developing Human Resources for Mental Health in Bangladesh

The paucity of human resources for health has undoubtedly affected the provision of services for people experiencing mental illness in Bangladesh. Developing, training, and retaining human resources for mental health in primary healthcare has received little attention from policy makers. Although the burden of mental illness is growing in Bangladesh, it has a low profile on the national public health agenda. Firstly, there is lack of national policy and strategy guidelines on mental health that can assist in planning. Secondly, insufficient funding for mental health resources, especially health personnel, hinders the process of further enhancing the prevention and treatment services for people with experience of mental illness in Bangladesh. Thirdly, healthcare workers, especially primary health care workers, seldom receive adequate training, supervision, and institutional support for sustainable skills growth. Fourthly, Bangladesh has a paucity of leaders in mental health, who have the appropriate skills to carry out multifaceted tasks and responsibilities, for instance, development of human resource policy for mental illness, reinforcing mental health related health services, and advising on population-level intermediations to prevent mental health problems. Finally, Bangladesh still lacks a coherent national surveillance and monitoring system for mental illness. Progress towards prevention has not kept pace with the rising burden of neuropsychiatric diseases, primarily because of a lack of prudent priority setting. The absence of effective interventions as well as non-adherence to international standards or frameworks (i.e., WHO Health Systems Framework and Health Workforce 2030) for surveillance and monitoring of mental illnesses have also put burden on developing human resources for mental health. As a result, the responsible government departments have largely been unsuccessful in planning and successfully carrying out multifaceted programs aimed at further strengthening the development of human resources for mental health.

SOLUTIONS AND RECOMMENDATIONS

Outlined below are strategies for increasing human resources for mental health based on lessons from LMIC.

Capacity Building and Task Shifting

Ongoing development of the workforce with appropriate skills is essential to strengthen the necessary human resources for mental health. Training should be relevant to the mental health needs of the population and include in-service training as well as the strengthening of institutional capacity to conduct effective training programmes. Approaches to psychiatric education also vary across countries (Savin, 2000; Singh & Ng, 2008). In Nigeria, a specialist training programme in psychiatry has been in place for more than 25 years, yet only half of the country's tertiary mental health facilities have enough psychiatrists to provide accredited training (World Psychiatric Association & WHO, 2005). Overall short-term training by specialist mental health professionals with ongoing monitoring and supervision can improve confidence, detection, treatment, and treatment adherence amongst people with experience of mental disorders and reduce caregiver burden. Academic programs for capacity development of mental health professionals are needed. At the same time there is a need to produce mental health leaders with appropriate advocacy and resource mobilization skills.

Task shifting, referred to as delegating tasks to less trained health workers with supervision, has been widely recognized as an efficient method to deliver healthcare in low resource settings. A high proportion of mental health services can be delivered in primary care settings by non-specialists. Primary level health staff need to be better trained and supported to identify and manage mental disorders. However, Bangladesh is lagging behind in providing appropriate training to primary health care personnel, which seriously affects the quality of mental health services. The sustainability of knowledge and skills gained remains uncertain, and further examination of effective supervision and mentorship is needed. With the increasing prevalence of chronic diseases and an aging population (S. Islam, 2010), the need for mental health professionals in Bangladesh is likely to increase in the future. Training mid-level health workers will help to improve the delivery of health services for health (L. Rawal et al., 2016), including mental health.

Effective Human Resources Policies for Mental Health

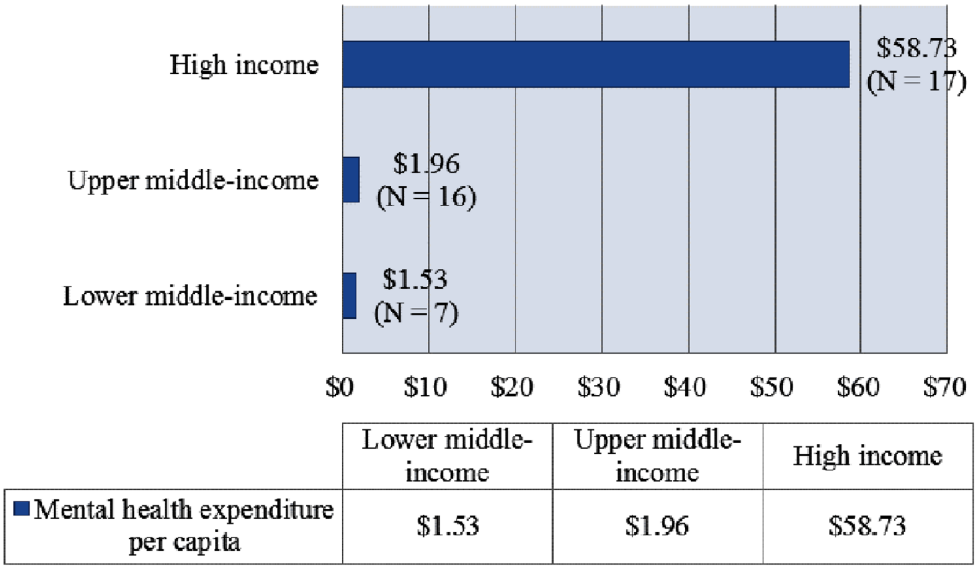
Despite extensive evidence and agreement on what are effective mental health practices for people experiencing severe mental illness, research shows that routine mental health programs do not provide these evidence-based practices to the great majority of people (Drake et al., 2001). National health policies and plans often fail to include human resources for mental health. Developing countries need to adopt both short-term and long-term policies for mental health workforce development based on the needs of health systems and national capacities. A recent report concluded that Bangladesh needs more effective policies and provisions designed specifically for attraction, deployment, and retention of human resources for health in rural areas, and the execution of these policies and provisions must be monitored and evaluated effectively (L. B. Rawal, Joarder, Islam, Uddin, & Ahmed, 2015).

Financial Management

Scaling up of human resources and training will incur huge costs. Mobilization of financial resources to develop human resources for mental health care is one of the biggest challenges in fashioning effective mental health systems (Saxena, Sharan, & Saraceno, 2003; Saxena et al., 2007). All LMIC have inadequate funding for mental health. Cost-effectiveness studies for the scaling-up of skills and the development of non-specialist health workers are scarce (Chisholm, Lund, & Saxena, 2007). Clearly, further studies are necessary to inform planners and policy makers on the required human resources for mental health. Strategic changes in payment systems are as important as financing in bringing about system change (Chisholm, 2007). For example, increasing the role of psychiatrists as supervisors and trainers, and boosting the number of other mental health workers, will need payment arrangements that recognize changes in these roles. These alterations will also be important for shifting practice from institutions to community settings.

Financial resources are an apparent requirement for developing and maintaining mental health services and moving towards programme goals (WHO, 2015). Based on *Mental Health Atlas 2014* data, it is possible to generate reliable information on the extent of government spending on mental health in both developed and developing countries. Figure 2 illustrates median government mental health spending per capita for countries at different levels of income. Expenditure levels in low and LMIC groups is very low (less than US $2), and falls far below levels estimated for high-income countries (over US$ 50 per capita) (WHO, 2015). Nevertheless, mental health expenditures by the government in Bangladesh represents less than 1% (0.44%) of the total health budget. Furthermore, mental hospital expenditure-comprises 35.6% of the total mental health budget, which is lower than that in many developing countries (A. Islam & Biswas, 2015).

Figure 2. Median mental health expenditure per capita (US$), by World Bank income group in 2013
Source: WHO, 2015



	Lower middle-income	Upper middle-income	High income
Mental health expenditure per capita	$1.53	$1.96	$58.73

Leadership

Effective leadership is critically important for scaling-up the mental health workforce (Schiffbauer, O'Brien, Timmons, & Kiarie, 2008; Sherk, Nauseda, Johnson, & Liston, 2009). However, there is a scarcity of research and/or evidence that addresses this issue adequately. A case example from India highlighted the implications of good leadership when funding for mental health was increased substantially. The University of Melbourne has been conducting an international mental health leadership programme since 2001 (Beinecke, Minas, Goldsack, & Peters, 2010). This 4-week course provides training in mental health policy and systems, mental health workforce, and mental health and human rights for researchers, psychiatrists, mental health professionals, and decision makers. Shorter 2-week leadership courses have been developed subsequently in many countries, including Indonesia, India, and Nigeria. Anecdotal evidence suggests that the courses and ongoing support for alumni have a positive effect in their home countries. In contrast, political will in taking decisive action to bring about change, is rare in the context of mental health services in Bangladesh. Thus, policymakers often miss the mark to develop incentive programmes for human resources for mental health in Bangladesh.

Information Technology for Mental Health Workforce Development

In recent years, with the growing use of mobile phones, their application in health is increasing at a rapid pace. Mobile phone technologies have been shown to improve medication adherence, glycemic control (Islam, Niessen, Ferrari, Ali, Seissler & Lechner, 2015), decrease blood pressure (Bobrow et al., 2016), and overall help to reduce the burden of chronic diseases and thus to build a healthier nation (Chow et al., 2015). The use of telemedicine for mental health could be used to provide a range of services to patients and healthcare providers including training for the mental health workforce working in rural and remote regions.

Brain Drain

The migration of mental health professionals from LMIC (Jenkins et al., 2010), and rural-to-urban migration, seriously affects the development of human resources for mental health. Professional isolation, social facilities, insecurity, and lack of better training and career opportunities are key reasons for emigration (Gureje et al., 2009). The U.K., the U.S., New Zealand, and Australia collectively employ almost 9,000 psychiatrists from India, the Philippines, Pakistan, Bangladesh, Nigeria, Egypt, and Sri Lanka (Jenkins et al., 2010). Without such migration, many source countries would have more than doubled their number of psychiatrists per 100,000 population.

Establishment of local training programmes is especially important to reduce the likelihood of out-migration of health professionals. International development partners could help develop and implement effective strategic collaborations and in scaling-up human resources for mental health (Hauff, 1996). It is encouraging to note that following the launching of effective training programmes in Ethiopia, the number of psychiatrists rose from 11 to 34 between 2003 and 2009 (Alem, Pain, Araya, & Hodges, 2010). The success of the initiative has led to its expansion to cover 14 different health programmes (see http://taaac.com/). However, Bangladesh lacks effective strategies in retaining available human resources for mental health. Clearly there is a need to further strengthen the official capacity building efforts that can stimulate career development opportunities for health workers, especially those in the mental health field.

Role of Mental Health Nurses

Mental health nursing is built on a philosophy of holistic care and a client-centered approach, where the nurse strives to empower the client to regain control of their lives (Barker & Buchanan-Barker, 2011). Mental health nurses should have the interpersonal skills to communicate effectively with clients, based on mutual trust and respect (Ross, Clarke, & Kettles, 2014). Fundamentally, they have the core duty of maintaining patient well-being, and the promotion of mental and physical health to its optimum, including the prevention of mental illness (WHO & International Concil of Nurses, 2007). In LMIC, mental health nurses often act as the primary providers of care for people with mental disorders due to the insufficiency of other mental health professionals in these countries. In addition to their role of providing direct care, mental health nurses often have administrative and policy-making responsibilities, prescribing, and medication management roles, as well as managing patient wards and performing follow-up care in the community (Barrett et al., 2009; WHO & International Council of Nurses, 2007).

Despite these significant roles for mental health nurses, the importance of mental health nursing care and the critical role nurses have in providing mental health care is largely unrecognized. Therefore, there is a serious need to develop nursing professionals for mental health in LMIC, empower nurses with proper delegation, incentives, and prescribing authority. A previous study suggested that nurse prescribing is perceived to enhance care and offer better delivery of services (Devane & Leahy-Warren, 2015). Furthermore, mental health nurses have indicated that obtaining prescriptive authority would simply legalize what nurses are already doing in everyday practice (Devane & Leahy-Warren, 2015). In addition, there is a need to clarify the role of nurses within a nursing care model in order to improve mental health services. It has also been recommended that basic and graduate nursing curriculum on mental health education be enhanced to have more hours focused on mental health, prioritizing psychiatry, standardizing training curriculum on a global level, and including multidisciplinary influences in nursing curriculum (Barrett et al., 2009).

Role of Other Mental Health Workers

Psychosocial workers have an important role in the delivery of mental health services as well. For example, in India, social workers have facilitated support groups for patients and caregivers as part of a multidisciplinary mental health team (Murthy et al., 2005). Chile has provided psychosocial education to patients and other relevant parties about mental illness, its treatment, relapse prevention, and monitoring (Araya et al., 2003). Psychologists have also applied effective psycho-social education interventions to reduce caregiver burden and improve their attitudes in Chile (Gutiérrez-Maldonado & Caqueo-Urízar, 2007; Gutiérrez-Maldonado, Caqueo-Urízar, & Ferrer-García, 2009). Hence, psychosocial education for caregivers of individuals with experience of mental illness (Kulhara, Chakrabarti, Avasthi, Sharma, & Sharma, 2009) can result in better mental health and well-being outcomes. A recent study in Bangladesh reported that among people with a drug addiction, psychological factors were associated with an increased likelihood of relapse (Rahman, Rahaman, Hamadani, Mustafa, & Shariful Islam, 2016). Therefore, the training of clinical psychologists to support people with a drug dependence or mental illness should be considered by policy makers.

Recommendations

Multifaceted approaches that address the paucity of human resources for mental health and staff supply in underserved areas will help ensure accessibility of health care facilities for poor people of Bangladesh. The barriers to progress in developing human resources for mental health can be overcome by the generation of strong political support to improve the number of appropriately trained health workers and actively engaging them in unconventional solutions for further strengthening the workforce. This will require highly skilled public health specialists in mental health leadership positions, and collaboration with stakeholders/donors to address the human resources crisis. This will pave the way for financial support for sustainable human resources for mental health, appropriate legislation and policies, and their alignment with national health policies. The changeability in roles of different mental health workers across LMIC settings stresses the significance of aiming for a skill-mix rather than a staff-mix approach in further enhancing human resources for mental health (Fulton et al., 2011).

A well suited national human resource for mental health strategy, as well as programs tailored to the local context and consistent with the WHO Health Systems Framework and Health Workforce 2030 will ensure the availability of trained staff and well equipped health facilities for mental health. Hence, surveillance and monitoring of human resources for mental health are crucial in better understanding and overcoming key challenges to developing human resources for mental health and in improving mental health services in Bangladesh. Professional certification and life-long learning for mental health workers will support better quality of care (Dey, Standing, & Islam, 2009).

FUTURE RESEARCH DIRECTIONS

There have been global efforts to develop a practical framework to support governments and health administrators to work on and implement a comprehensive plan to achieve sustainable health workforce development in response to widespread shortages (WHO, 2006). The Human Resources for Health Action Framework (Dal Poz et al., 2006) encompasses six interlinked elements necessary for human resource development (policy, health workforce management, finance, education, partnerships, and leadership), could provide an expedient approach to effectively addressing the challenge of scarcity in human resources for mental health.

Stronger collaborations and cross country comparisons presented in this chapter will also contribute to lessening the shortages in human resources for mental health in Bangladesh (Skeen et al., 2010). However, further research is needed to better understand the dynamics and complexity of the issues underlying the scarcity of human resources for mental health. Developing simple effective models of care for mental health human resources should be explored. The newer models could involve task shifting of specialist care to junior doctors and general practitioners in primary health care. It could involve nurses, psychologists, social workers, and community health workers diagnosing and referring cases to primary health care. Following evidence from other countries, there is a need to explore the models of mental health service integration into existing primary care and community services. Future research on policies and operational programs for rural retention of human resources are also recommended.

The authors did not identify any literature related to the role of community resources, for example, alternative mental health care providers. This issue requires further investigation as in many LMIC,

especially in Bangladesh, alternative care is generally sought before that from a mental health specialist or practitioner. While task shifting has been suggested as a mechanism to address the human resources shortage, a sustainable model based on the local needs deserves to be tested and evaluated.

CONCLUSION

There is an urgent need to improve the mental health workforce in LMIC. Human resources are recognized as the most significant asset of mental health services. The WHO and governments have endorsed the need to strengthen human resources for mental health globally. In spite of this, human resources for mental health continue to be inadequate in most countries. The scarcity is likely to worsen unless significant investments are made to train a broader range of mental health workers in LMIC. Scaling up and training entails substantial investment, rigorous planning, and effective leadership. Training programs must be tailored to the needs of the local population and countries. Ensuring ongoing career development opportunities and task shifting will a play a crucial role in the development of human resources for mental health. The generation of reliable data on mental health systems and workforce will also aid future planning. Effective policies, planning, and investment for human resources development and retention are vital. The authors recommend a systemic multidisciplinary approach with strong partnerships among government ministries, NGOs, health practitioners, and communities to ensure improved mental health services in Bangladesh with appropriately skilled and an adequate number of human resources for mental health.

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KEY TERMS AND DEFINITIONS

Capacity Building: Activities aimed to increase the ability of individuals, institutions, and societies to perform optimally to achieve its objectives in a sustainable manner.

Human Resources: All people who make up the workforce of an organization.

Low and Middle Income Countries (LMIC): Countries with per capita gross national income from $1,045 or less to $12,736 are defined by the World Bank as LMIC.

Mental Illness: A health problem that significantly affects how a person thinks, behaves and interacts with other people and is diagnosed according to standardized criteria.

Primary Health Care: The first level of contact individuals, families and communities have with the health care system.

Task Shifting: A process of delegation whereby tasks are moved, where appropriate, to less specialized health workers.

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Chapter 21
Demand for Health Care in Kenya:
The Effects of Information About Quality

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ABSTRACT

Although studies on health care demand have previously been conducted in Kenya and elsewhere in Africa, it has hitherto not been shown how health seeking behavior conditional on illness is affected by information on health care quality and by quality variation conditional on that information. This study develops and tests the hypothesis that the information available on service quality at a health facility significantly affects demand for health care, and therefore, parameter estimates that ignore information available to patients about service quality might be biased. The authors highlight the need for public provision of such information. They also draw attention to a potential limitation of demand analysis in the design and implementation of health care financing policies.

1. INTRODUCTION

Poor health is cited as the most frequent and main cause and consequence of poverty. Martin and Haddad (2006) argue that in developing countries, some regions and segments of the population are particularly disadvantaged in terms of access to basic health care, and that broad availability of such care is essential for health improvements. It is not surprising therefore that quality health care provision is one of the priorities of the Government of Kenya.

Kenya's health care system is pluralistic with a wide range of players, including government, non-governmental organizations, and the private sector. The health ministry, operating a national-wide system of health faculties, is the largest financier of health-care services in the country. The health

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services are provided through a network of over 4,700 health facilities countrywide, with the public sector system accounting for about 52% of these, and the remainder being run by the private sector and non-governmental organizations.[1] Although the various players have expanded the physical infrastructure for health provision in Kenya, facility distribution and coverage remains uneven, especially in rural and underserved urban areas such as slums.

It has been argued that the government's effort to address the challenges of poor access to health care has been biased towards the supply side, e.g., the construction of new health facilities and recruitment of additional health personnel, but has ignored demand side issues (Kamau and Muriithi, 2006). Currently, with the introduction of devolved funds, and especially the Constituency Development Fund Act of 2003 (CDFA, 2003)[2], many new health centers have been created, suggesting that at the grassroots level people are identifying health care provision as an important issue in the fight against poverty (Kamau and Muriithi, 2006). However, it is necessary to go beyond supply side issues and also consider factors that affect health seeking behaviors, because such factors might hinder utilization of the services made available to the poor (WHO, 2002).

In urban areas, slums harbor the poorest social groups who are often unable to afford basic health care. Although health services must of course be provided, policy makers need to understand the factors influencing demand for them to avoid spending resources on services that might not be used (Fosu, 1989). Despite well-known in-depth studies on health care seeking behavior in rural Kenya (Mbugua et al., 1996; Mwabu et al., 1995; Collins et al., 1996), similar studies in urban slums are missing.

This study is an attempt to fill this void. The need for a study of this kind is evident from results of a casual analysis we conducted using data from a baseline survey undertaken by UN-HABITAT in a Kibera slum in Nairobi under the auspices of a slum upgrading project in 2005 (Republic of Kenya, 2005). In that survey, over 70 percent of the respondents said they did not visit government health facilities even though these facilities were nearer than alternative facilities. Moreover, the alternative facilities visited were more expensive than the government facilities, both in terms of time spent to seek treatment, and the monetary expenditures on consultations and drugs. An even more puzzling finding from our preliminary analysis is the fact that patients who visited government health facilities said they faced no problem there with the availability of drugs, which in the health care demand literature is considered the main determinant of service quality (Mwabu et al., 1993; Sahn et al., 2003). Our working hypothesis is that uncertainty about the quality of a health facility can reduce or increase health care demand or leave it unaffected, depending on the kind of information households have concerning the available health services. For example, lack information about the quality or type of services at a health care facility and might affect the decision to visit or not to visit that facility. In addition there may also be information lag. For instance, if the last time an individual visited a facility quality of services received was poor then, even if service quality improves, the visit-probability may decrease because of information lag. The reverse is also possible so that a decrease in the service quality at a previously visited facility may have no effect on visits, if people have outdated information about service quality.

2. ANALYTICAL FRAMEWORK

Following the established demand literature (Akin et al., 1995; Dow, 1995; Gertler and van der Gaag, 1990) we briefly describe the health care decision processes during an episode of illness,. Among the many factors that determine the choice of a health care facility by a patient is its quality. Health care qual-

ity includes process, technical capabilities, efficiency, and outcome expectations of health care provision (Akin et al., 1995). Therefore, an expected utility is attached to each facility within reach, and individuals choose the facility with the highest expected utility of treatment (Gertler and van der Gaag, 1990).

A fundamental assumption in modeling health care decisions is that all attributes of health care are observable. Without this assumption, patients have difficulties distinguishing between effective and ineffective services and may never detect those facilities that provide high quality services. Insight into this phenomenon of asymmetric information originated with the work of Akerlof (1970). Since the health care provider usually has better information about the quality of services than patients, information is asymmetrically distributed. Therefore, patients' information about service quality may lag behind reality but, whether it is correct or not, it affects health care demand and the choice of a health care facility among available alternatives. This possibility should therefore be taken into account in the estimation of health care demand.

We illustrate the role of information in the demand for health care using a multinomial probit model of provider and treatment choice in the event of illness, as in Bolduc et al. (1996). Interested readers may consult Gertler and Van der Gaag (1990), Sahn et al. (2002), and Lindelow (2005) for exposition of these models in the context of health care demand analysis in low-income countries. Since these models are well known (Bliss, 1934; McFadden, 1981) and extensively used in the health economics literature (Akin et al., 1995; Culyer and Newhouse, 2000), no attempt is made to specify them here. However, the reader should know that a multinomial probit model of provider choice is preferred because it relaxes the independence from irrelevant alternatives (IIA) assumption (Buldoc et al., 1996; Dow, 1999; Muriithi, 2009).

Under the IIA assumption (Horowitz and Savin, 2001), a provider choice model would be specified as if the unobservable factors characterizing health facilities are uncorrelated, so that when a patient is evaluating a pair of facilities, all the other options in the choice set are assumed to be irrelevant for the treatment decision in question. McFadden (1974, p. 113) made the IIA problem famous in discrete choice models by his example of commuters' choice between auto and two similar buses. This example is commonly known in the discrete choice econometric literature as the blue bus/red bus problem (Wooldridge, 2002). Adopting the bus color metaphor, if two-thirds of a random sample of patients are observed to have chosen a hospital and one third a blue clinic, the construction of a red clinic would have no effect on the choice odds between a hospital and a blue clinic. It is easily checked that before the introduction of a red clinic, the choice odds ratio was $(2/3)/(1/3) = 2$, which is unaffected by the red clinic. Except for the color of the paint on their roofs, the two clinics are the same in terms of the treatment they offer. Thus, the choice probabilities after the introduction of the red clinic are one a half for the hospital; one quarter for the blue clinic and a quarter for the red clinic, which maintains the original relative choice probabilities between a hospital and a blue clinic at $2 = (1/2)/(1/4)$.

The new probabilities are unreasonable in a model of rational choice because in real life, patients would discover that the two clinics are the same, i.e., they are perfect substitutes in treating diseases. Thus, the observed probabilities would be one-sixth for each clinic and two thirds for the hospital. That is, the patients initially choosing the blue clinic would distribute themselves evenly between the two clinics, and patients in the hospital would have no reason to move. A probit model of provider choice (Buldoc et al., 1996) is consistent with the choices of this sort, which are free from the independence of irrelevant alternatives.

3. DATA

The survey yielding the data for this study was conducted by one of the authors in Kibera slum in Nairobi (Muriithi, 2009) and was conducted in 2007, two years after the HABITAT survey noted above (Republic of Kenya, 2005). It covered residents who had lived in Kibera slum for at least one month prior to the survey. A household is the unit of analysis and is defined as a group of people living together under one roof or a housing unit; or as people living under one roof, sharing a common holding as a source of income and food. Under these definitions, household members in the sample are persons who had stayed in a housing unit for at least four days in a week prior to the survey. The Kenya National Bureau of Statistics provided logistical support in selecting a random sample of 493 households that satisfied the two inclusion criteria, namely, slum residence and having lived there for four weeks prior to the survey. The above-mentioned definition of a household is adopted from this agency. Questionnaires were administered to the sample household for a period of four months. An additional survey was conducted on health facilities to collect information about service availability, quality, and cost.

4. DESCRIPTIVE STATISTICS

Males and females comprise 44.5% and 55.5%, respectively, of the survey respondents. The mean age of the head of household is 35.3 years, and the average household size is approximately 4 persons. In the slum area surveyed, 5.2% of household heads have no education, while most (49.5%) have some secondary school education. In terms of occupation, the majority of the household heads (54.5%) are in wage employment, mainly in the informal sector. A third of the household heads are self-employed, and 12.2% are unemployed. This low rate of urban unemployment reflects the fact the household heads surveyed are poor and cannot afford to support themselves and their families without engaging in some activity. In addition to the information in Table 1, other survey results show that Christianity (83.4%) is the dominant religion; with heads of Islamic faith and other religions accounting for the remainder (16.6%). The majority of the household heads are currently married (72.3%).

The sample statistics in Table 2 show only a small variation in the information held by households about the services provided by health facilities. However, there are large variations in the trust and quality indices, suggesting significant heterogeneity in the degree of trust that the households have in treatment abilities of providers or in the efficacy of their medications.

5. ESTIMATION RESULTS

Table 3 presents the results of our provider choice model. The reported parameter estimates can be interpreted as marginal changes in probit indices associated with health facilities, not as marginal changes in the probabilities of a patient consulting the facilities. Although the marginal changes in probit (Table 3) differ from the marginal changes in probabilities (available on request) both have the same sign so that a demand factor that decreases or increases a probit index has the same qualitative effect on visit probability. The results are discussed in Section 6.

Table 1. Description of variables

Variables	Description
Health facility usage dummies	These are dependent variable dummies that take values of one or zero in some cases depending on whether a public clinic, a private clinic, a hospital, and a public hospital was chosen.
Self-treatment dummy	This is the dependent variable dummy to capture alternative provider options, including self-medication, home remedies, medication from shops or counseling from friends.
User fees	Out-of-pocket cost per visit to a health facility.
Distance	Distance to the nearest health facility, in kilometers.
Quality of a health facility	An index derived from data obtained from health facilities using administered questionnaires about what constitutes good quality care. Each of the quality elements identified at a health facility was given a score, which increases with quality. The scores were then aggregated and averaged to obtain a single quality index for a facility.
Gender	A dummy variable: male = 1; female = 0.
Age	Age in years for each individual in the household.
Health information score	An index constructed from the qualitative information given by respondents about qualifications of health personnel, type of treatment received, availability of immunization services, and whether or not a health facility was licensed. The higher the index the greater the amount of favorable information possessed by an individual about a health facility.
Trust index	An index constructed from information given by respondents about the degree to which they trusted health care providers in their locality.
Household size	Number of household members.
Occupation	1 = formal employment, 0 = otherwise.
Acreage	Land holding in acreages in an urban center or elsewhere.
Education	Years of completed schooling.

6. DISCUSSION OF RESULTS

User fees and distance to health facilities have the expected negative coefficients, indicating that demand curves for health care slope downwards at all health facilities. This finding suggests that an increase in fees would, *ceteris paribus*, reduce health care demand in the health system. It is also noteworthy that an improvement in quality of care across all facilities increases demand in all facilities. The demand impact of a quality increase is pronounced at private health facilities. It is also possible that private health facilities have a greater financial incentive to improve service quality than public facilities since they depend on patient-generated revenues to a greater extent than public facilities. This finding agrees with findings by Sahn et al. (2003) in Tanzania and Ellis et al. (1994) in Egypt, that good medical care, measured by the proxies qualified staff and availability of medication, is associated with higher probabilities of being visited. Patients' trust (McGuire, 1983) in health providers is an important determinant of demand for health care in Kibera slums. As the degree of patients' trust in a provider increases, the probit index increases. The implication of this is that the more trusting the relationship that a provider builds with patients, the higher the probability of a visit to that provider in the event of illness or injury. Since trust is built over time, this suggests that fast turnover of medical personnel is undesirable.

The waiting time coefficients are positive and statistically significant for all facilities. There are several reasons to expect such a result in this model. First, the expected marginal utility from contact with a health provider could be higher than the disutility from the time spent waiting for treatment. Moreover, waiting time might be positively correlated with unobservable or unmeasured aspects of service qual-

Table 2. Sample statistics

Variable	No of Observations	Mean	Standard Deviation	Min	Max
Completed years of schooling	483	9.904	4.078	0	19
Period of stay in the present house, months	480	125.56	9.76	1	660
Size of household	483	3.98	1.95	1	9
Distance to the nearest health facility, kilometers	483	.05	.37	.01	1.5
Approximate time taken to the nearest health facility, minutes	483	5	.45	.1	10
Distance to the visited health facility, kilometers	399	1.73	1.89	.1	9
Time taken to the visited health facility, minutes	399	17.89	20.084	.1	120
Consultation or user fee, Kenya Shillings	399	194	304.93	0	800
Number of visits made to health facility per a year	398	1.7	1.85	1	24
Approximate waiting time at the health facility visited, minutes	399	63.0725	79.288	0	360
Gender (1=male, 0= female)	483	0.4451	0.4974	0	1
Rental income per month, Kenya Shillings.	429	1,164.809	4,121.685	0	30,000
Total household income per month, Kenya Shillings	483	10,718.07	7,153.826	1,000	50,000
Acreage of land holding in the slum or elsewhere	483	1.7	2.936	0	30
Age of the head of the household	483	35.30	10.4438	17	73
Total expenditure per month, Kenya Shillings	483	9,088.454	4,976.34	2,470	48,300
Number of people depending on household's income	483	4.316	2.62	1	17
Age of patients in years	400	17.35	14.63	1	89
Health care information index	483	5.63	1.7	0	12
Trust index	483	9.79	6.30	3	17
Quality of health facility index	483	24.8	36.02	5	43
Annual health expenditure, Kenya Shillings	483	933.33	2134.43	0	50,000

ity. Finally, it is possible that people in slums visit health facilities until they are too ill to work when the expected benefit of waiting for treatment outweighs the expected labor income foregone. However, if we had proper controls for unobservable variables, the estimated coefficient on waiting time (a time price) could be negative even if the earnings forgone by those who are very ill are low because there are alternative uses of waiting time, such as bed rest. Thus, the estimated positive coefficient on waiting time may be due to unobservable factors that are correlated with waiting time.

The coefficient on the service information index is statistically significant, particularly at private health facilities. It appears that private health facilities benefit more from households' information about services offered by health facilities. This finding is coincides with that of Thompson (2003), who reports that lack of information negatively affected utilization of health facilities. Our results also find support in Kenkel (1990) who, also using a probit model, found patients' health care seeking behavior was influenced by their information about available services, a finding also obtained by Hsiech and Lin (1997) in their study which showed that information influences the usage of health services. The strong effect of the information variable on demand at private health facilities suggests that these providers advertise for their services.

Table 3. Multinomial probit estimates of provider choice model (Absolute t-statistics in Parentheses)

Variables	Coefficients			
	Public Clinics	**Private Clinics**	**Public Hospitals**	**Private Hospitals**
User fees	-.0024255 (14.15)	-.0002908 (7.07)	-.0000742 (2.58)	-.0000775 (2.60)
Facility quality index (increases with quality)	.2587349 (2.42)	.7040708 (6.11)	.1360388 (1.26)	.7008101 (5.86)
Waiting time	.0267798 (2.83)	.0206639 (2.19)	.0318304 (3.37)	.0193221 (2.04)
Health information index	.7069139 (2.45)	3.53655 (11.29)	1.2477 (4.33)	4.351906 (13.14)
Acreage	-.5226657 (3.29)	-.2003306 (1.28)	-.4423209 (2.83)	-.2330826 (1.48)
Trust index (increases with trust)	.3904678 (6.44)	.3473449 (5.33)	.446738 (7.11)	.397244 (5.89)
Distance	-1.959018 (2.79)	-1.75095 (2.41)	-5.55266 (2.22)	-1.469643 (1.97)
Household size	1.083069 (5.95)	.8382298 (4.57)	.787664 (4.38)	.6851694 (3.65)
Occupation (1=formal employment)	-.1358581 (0.93)	.1987752 (1.26)	-.0179633 (0.12)	.1198647 (0.73)
Education	.2972528 (2.95)	.214329 (2.51)	.2534123 (3.06)	.2059749 (2.38)
Age	.10030717 (2.37)	.874665 (3.01)	.0880447 (3.20)	.112462481 (3.76)
Gender (1= male)	-2.412717 (2.37)	-.8678854 (1.49)	-1.584831 (2.80)	-.4762481 (0.80)
Constant	-15.71434 (4.77)	-23.1153 (10.20)	-13.01778 (6.24)	-29.08893 (12.24)
Log-likelihood=-1085.3693; Wald Chi2(44) = 828.25 Number of observations = 483				

7. POLICY IMPLICATIONS

The estimation results show that service quality is associated with increased use of private and public facilities relative to self-treatment. Since in this study, waiting time is positively correlated with quality, the results suggest that policies that increase service quality would be accompanied by longer queues at health facilities. Ways for managing such lines should be part of quality improvement strategies to avoid congestion at health facilities that would undermine efforts of the health personnel to provide effective care.

Information on health services is an important determinant of demand. This finding suggests that public health information campaigns can be used to change health care seeking behavior of patients and improve health. For example, such campaigns can be used to increase demand for TB and malaria treatments or increase demand for immunization services. Therefore, advertising campaigns by private providers may lead patients to "over-use" medications monitoring of such campaigns may be warranted. The strong demand effect of information indicates that an efficient mechanism for updating the general public about services and innovations would encourage the — more efficient — use of health care services.

The strong negative demand effect of fees indicates that there could be a high return to social welfare if the cost of health care in slums would be kept low. However, abolition of fees at government clinics located in slums is one way of making basic health care more broadly available to slum residents; experience in Africa suggests caution in implementing such a policy. Recent studies on demand effects of user fee waivers show that the initial increase in service utilization associated with fee abolition is hard to sustain (Nabyonga et al., 2011; Lagarde et al., 2012). What can then be done to make basic health services broadly accessible to poor people in slums and underserved areas? Demand studies of the type reported in this chapter cannot generate all the evidence needed to design and implement health care financing strategies that ensure sustainable access by the poor. Also needed is evidence from studies of the ability of the government to sustain such a subsidy program. It is also important to gather evidence on how withdrawal of income from facilities through reduction or abolition of user fees affects their performance. In summary, demand analysis alone is not able to provide information on how to solve health care financing problem in slums and low-income areas, in general. Policy makers in Africa have previously overlooked the limitations of and relied exclusively on demand evidence to implement health care financing policies, which therefore did not have the desired effects.

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ENDNOTES

1 Kenya has approximately 42 million inhabitants and a land area of 582,646 sq. km (224,961 sq. miles). Life expectancy is 57 years for men and 59 years for women.

2 The CDFA-2003 was amended in 2007 and in 2013 was replaced by a new the Constituency Development Fund Act (CDFA-2013).

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Chapter 22
Hospital Units Merging Reasons for Conflicts in the Human Resources

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ABSTRACT

The necessity for the control of expenses of health and the reduction of cost, led the Ministry of Health and the government of Greece to the decision-making for fusions of hospitals units of health following the new tendency of health's policy that prevails also in other countries. The research purpose was to appoint the positive and negative results from the fusions of hospitals. Any changes in the health care system aim at the reduction of expenses, however, they constitute the most frequent causes of conflicts among employees. The Hospital is characterized as a natural space for the growth of conflicts. Despite the oppositions that are recorded as for the positive and negative results, it appears finally that through the fusions, resources have been saved, management systems have been improved but in the same time, conflicts in the labour place between the individuals and the teams recruiting hospitals have been aggravated.

INTRODUCTION

The human resources in the health sector is an essential chapter not only its quantitative but also qualitative composition. Although more and more modern technology permeates the health sector, health remains relatively an intensive labor. According to the World Health Organization (WHO) more than 60% of health expenditure is devoted to human resources. So issues that are related to the management and development of human resources in the health sector are of major importance (Liaropoulos, 2007).

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The health system is primarily a set of human relations and especially interdependencies. These relationships are hardly disturbed and even harder solutions are "positive sum", where everybody benefits from possible changes. Health services have multi- professional structure and require corporation of an appropriate number of different professionals in order to have a satisfactory result that corresponds to quantitative and qualitative criteria (Liaropoulos, 2010).

It is obvious that in hospitals, which are complex organisms, there is a need for interdisciplinary cooperation, in order to achieve clinical goals related to the sick, and the other objectives related to management issues. The need for interdisciplinary cooperation increases the degree of interaction between health professionals and it is a fact that the more increasing the interactions are, the greater the possibility of a conflict. The maintance of harmonious labor relations and the interdisciplinary cooperation are considered a necessity for health professionals, along with the performance of their duties (Stathopoulou, 2006).

Many groups interact and engage in conflicts during the provision of health care. The conflict is associated with human emotions, such as feelings of neglect and underestimation and indifference. The anger grows inside the person, which can be transformed into rage, and behaviors such as melancholy, or even violence might appear (Papadopoulou, 2009).

Feelings and attitudes that are developed impede the smooth execution of work and as a result the productivity is reduced and errors or omissions are made (Swansburg & Swansburg, 2003).

In a constantly changing society and with the current global economic crisis, which also hit Greece in recent years, the need for state intervention in the economy for the rational allocation of resources was obligatory, including the health sector, as well. Empirical studies record dramatic changes in the epidemiological map of the country, causing an increase in demand for health services and as a result increase the expenses of health care (Stiglitz, 2010; Adamakidou and Kalokairinou-Anagnostopoulou, 2009; Selgelid, 2007).

In times of crisis, when resources are limited there is a need for changes in consequent adverse situations, accompanied by stress, confrontations and conflicts (Likert & Likert, 1976). Conflicts within organizations are inevitable and arise because of rapid and unpredictable pace of upcoming changes, new technological developments, competition for scarce resources, differences in cultures and beliefs, as well as different human personality types (Brown, 1983). Factors such as the size and the complexity of the organization, the increased interdependence and the rapid social and technological change influence the cause of conflicts in a high degree (Bateman & Snell, 2004).

The right to health is a basic human right enshrined in the Constitution of the World Health Organization and most UN treaties and more recently by the Treaty (Roth, 2004) establishing a European Constitution (Article II-95 of the Charter the European Union's Fundamental Rights) (European Union, 2004) which recognizes the right of every person to have medical care, and states that this right must be recognized through the laws of each Member State of the European Union, as a prerequisite to support the health system.

The establishment of the National Health System (NHS) in Greece under Law.1397 / 83 (Government Gazette 143A / 1983) came as an urgent need for the establishment of a modern health system responsive to the real needs and aspirations of the Greek population, ranking the country according to the World Health Organization in 2000 to 14th place in developed countries health (WHO, 2000).

The need to control health care costs and to reduce costs, as far as 10% of gross national product (GNP) is binded, led the NHS to decide for hospitals merging. Bed mergers and the rational allocation of human and material resources, following the new trend of health policy prevailing in other European Union

countries, in order to increase efficiency, evaluates the hospitals and public health system as a whole, maintaines the equal access to health services as an important social criterion (Tsavalias et al., 2012).

The Hospital mergers in Europe are implemented as part of an overall reform of the health services. Aimed at the improvement of efficiency and effectiveness to the enhancement of the quality of health services and the rationalization of the distribution to health services in hospitals that is often regarded as a means of improving the provision of health services (Rotter et al., 2012).

According to a publication in the European Journal of Health Economics is reported that hospitals in Portugal have restructured with wide mergers, after convictions were made between institutions, policymakers in the larger hospitals that argue to the reduction of the average cost (Azevedo & Mateus, 2013). Incentives for integrating clinical wards and hospitals are the reduction of costs and the increase of productivity (Tsavalias et al., 2012).

In a multivaried analysis carried out by the Department of Health Management and Health Economics Institute Health and Society, School of Medicine University of Oslo, it is argued that the merger of hospitals is held for their best performance. It is reported that mergers are complicated and difficult processes which consistently lead to variable results. Changes may occur in the health of workers, resulting in long-term absence from the hospital. (Kjekshus et al., 2014).

Despite the contradictions recorded as to the positive and negative results, it seems finally that through mergers resources are saved and there is an increase of efficiency. On the contrary the conflicts are being increased among staff of health units as these mergers have the exact opposite effects (Tsavalias et al., 2012).

LITERATURE REVIEW

Conceptual Approach to Conflict

The term conflict can be attributed to multiple meanings. A conflict is defined as the result of a disagreement, incompatibility or mistrust within the people (with themselves) or even among groups and organizations (Rahim & Magner, 1995). It is considered a race condition in which one side tries to prevent the other to achieve its goals. A particularly important problem that an organization may face due to conflicts internally, is the non-recognition of compatible objectives. In other words, the contrasting sides of the conflict have different values and goals, which negatively affect the cooperation between them and the subsequent effectiveness of the organization (Wilmot & Hocker, 2001).

Generally, the term of the conflict suggests a collapse of the established decision-making mechanisms, resulting in the person or group to face difficulty in selecting of an alternative energy. Therefore, conflicts arise when an individual or a group face a problem in making decisions (Alper et al., 1998).

According to Robbins, three kinds of views characterize the cause of conflict in the collision theory. The traditional view, which the conflict is mallfunctional and is a result of poor communication, mistrust and maladministration in labor relations. In this regard the conflict is bad and directors or consultants must identify the causes and deal with them, by bringing stability and harmony. The next theory is that of human relations, which claims that the presence of conflict in groups is natural. That means that the conflict can be an advantage for one of the groups at time, which is why organizations must learn to coexist with it. The third approach proposes to encourage the conflict as a means of introducing changes and establishing of new structures and conditions for this change (Robbins, 1993).

Based on the last two concepts, conflict is a natural and inevitable phenomenon for an organization, except from the negative consequences, can bring positive results for an organization, such as to enable individuals to greater efford, be a driving force for positive changes in the organization or constitute development experience (Hellriegel & Slocum, 2010).

It is evident that the conflicts have both positive and negative effects. Positive effects include new ideas, the creation of innovation and changes, making better decisions, increase of participation, the potential increase in productivity, as well as the strengthening of relations, when they are solved positively by both sides. The negative effects include waste of energy, reduction of job satisfaction, reduction of productivity, making biased decisions and the creation of irresponsible behavior (Jameson, 1999).

The management of conflict within the organization is not necessarily refered to as a strategy of avoidance, reduction or elimination of the conflict. Instead it is regarding the strategic planning of effective strategies, which are primarily aim to minimize non-functional elements (malfunctional conflict) of this conflict with the parallel strengthening of its operating elements (functional conflict) (Menon et al., 1996).

As non-functional elements of the conflict are meant the negative reactions that hinder effectivness and are characterized by a low degree of emotional intelligence (Polychroniou, 2008a). Contrary to operating elements are referred to all these that help the organization to achieve its objectives and to improve performance, by keeping the conflict in middle levels. The maintance of operational conflict in middle levels strengthens communication, encourages the interaction among the individuals or groups and it is also associated with high levels of efficiency (Polychroniou, 2008a).

However, it is the duty of managers of an organization, to distinguish each time the functionality of a conflict, as well as the intensity that is desirable in order for the company to reap the highest benefits. A specific type of conflict may be desirable at a minimum level, but it can become uncontrollable after a particular point. An excellent level of conflict is that does not create stagnation, stimulates creativity and relieves tension, so as to increase productivity and create conditions for change without the creation of phenomena of disorganization and detuning or dissatisfaction and trends for withdrawal of emploees (Hellriegel & Slocum, 2010).

The way in which the manager will handle the conflict and will use it as a benefit of the organization is cosnidered a major issue for the smooth proccess.

Conflict Types

Conflicts can be formulated according to their origins. Based on this, they are divided into two broad categories: a) the conflicts that occur in the same individual and b) the conflicts that occur among individuals / groups / organizations.

From an organizational point of view conflicts could be categorized as:

- Hierarchical conflicts, these are among different hierarchical levels, eg between the Board and General Manager.
- Functional conflicts, among different functions or departments of the organization, e.g. between sales departments and production departments
- Conflicts of stems (Jehn, 1997).

The conflicts between individuals and groups are concidered a common and daily phenomenon in the workplace. Typically their symptoms are wariness, hesitation, aggression, indifference, anxiety and distress. The individuals and the groups that have different values, experiences, knowledge, skills, attitudes, responsibilities, needs and goals are obliged to coexist and to cooperate in an organizational environment, which is characterized by uncertainty and complexity in terms of structures, procedures, techniques, rules, and, concequently, conflicts are considered a natural consequence of this situation (Schermerhorn et al., 2007).

Then the conflicts within the person and conflicts between individuals / groups / organizations are analyzed in detail.

Conflicts in person: They are related to two opposite views that the individual can have. A person's value system can be opposite to the values of the organization. The individuals who are involved in situations in which their values come in conflict with their expectations, or when their morallity differs radically from the values that have been adopted by the organization and they may experience internal conflicts, which can get dangerous dimensions (Smither, 1994).

Conflicts of individuals / groups / organizations:

The conflict of the people is a product of organizational roles which are undertaken by individuals in an organization. Those individuals that fulfil their occupational role are involved in coflictions with themselves, because they compete in order to obtain limited organizational resourses (Alper et al., 1998).

The conflict of groups has to do with two reasons: a) the groups compete for the acquisition of limited resources and b) there are many different ways to manage the effective functioning of the parts of an organism.

The conflict of organizations is caused due to the attempt of increasing share in market (Schermerhorn et al., 2007).

Conflicts in the Workplace

Rapid developments, which cause changes in the working environment affect the way of resolving objective conflicts, show as to consider a basic goal of senior management. One of the factors, among others, which can contribute significantly to the proper functioning of an organization and particularly the hospital, except from teamwork among employees is the correct and continuous communication management with all employees, since it has proven that it can contribute effectively and efficiently to the constructive resolution of a conflict (Pavlakis et al., 2011).

It is a fact that the hospital can be described as a natural place for the development of conflict, especially when it is 'threatened' by industrial changes such as mergers of clinics etc. and as it is staffed by people of various professional groups, with different experiences, knowledge, attitudes, behaviors and perceptions and they are "obliged" through teamwork, to interact, contribute to the achievement of the organization's objectives (Tenglilimoglu & Kisa, 2005).

The uncertainty and the lack of resources in the health care environment create conditions of anxiety leading to increased conflict. A study of Whetten & Cameron (1991) found that the increase of the ethnocentric behavior makes workers have lower expectations, and, as a consequence, to reduce their participation in the decision-making process.

The conversation for changes in organizational structures can lead to uncertainty about the impact of the predictable changes to which people are involved. Any change to an existing role is thought to reduce its importance and also create conflict (Shortell, 1990).

The conflict may be characterized as hierarchical (among individuals or groups in a vertical relationship) or horizontal (among individuals or groups, on the same level), temporary or long term, and procedural (disagreement on the means) or and result-oriented (a disagreement on the ends or the results are obtained) (Shortell, 1990).

Types of Conflict in the Area of Health

The conflicts are considered a common phenomenon in the area of nursing and generally in the field of health and their solution often requires a considerable part of time of the Head of the Department. Usually managers / leaders do not suppress nor deny the conflict, but they see it as an opportunity and they do not feel threatened but they accept it as a challenge (Bennis, 1976).

Conflicts are created in cases where there is a discrepancy of views and values and also an incompatiblity in needs and in objectives. In complicated organizations, such as hospitals, the need for decentralization of decision-making and interdisciplinary collaboration increases the degree of interaction between health professionals so as to achieve clinical and administrative objectives. Thomas et al (2003) characterized conflicts as a phenomenon that leads to negative results. As interactions increase, the possibility for conflicts is multiplied.

According to Stathopoulou (2006) the concept of conflict refers to an expression of disagreement. Depending on the level at which the conflict occurs, the conflicts in the health sector are divided into: a) horizontal conflicts between individuals or departments that have similar power with the organization and b) Vertical conflicts between employees and management.

Another distinction of the conflict can be occurred by the members that are involved in, such as: a) Internal conflicts: these are psychological conflicts that occur within the same person and are related to incentives, beliefs and choices, b) interpersonal conflicts are between two or more people, c) the conflicts within a group which is related to the distribution of roles inside the group and the structure of relationships and d) the conflicts between groups which are associated with and resource allocation issues and delimitation of the area control of each group (Swansburg & Swansburg, 2003).

Finally the conflicts are classified into cold and hot. The hot conflicts operate efficiently and increase the creativity of the group while the cold inhibit communication and are not usually perceived (Swansburg & Swansburg, 2003).

Ways of Expressing of Conflicts in Hospital

Although there are common features in the ways of expresing a conflict in all organization, their occurrence in hospitals presents some peculiarities that are associated to with the nature of work and the structure of hospitals. Initially a smoldering dispute, which gradually takes the form of explicit contrast. A period of disagreement follows, which it depends on the mood, the position and the interests of the parts that are involved and it can stop or peak to an open conflict with disastrous consequences for the coherence and effectiveness of teams. Besides the direct confrontation between the parts, the conflict can be expressed and in other ways, such as: unacceptable behavior, negative body language (Gerardi, 2004), conflicts, denial, withdrawal (Porter, 1996), uncontrollable and aggressive competition (Constantino & Merchant, 1996), sabotage, frustration, apathy, decreased productivity (Constantino & Merchant, 1996; Gerardi, 2004).

Hospital Mergers

Since 1983, which is considered an important year for the development of the NHS, till nowdays it could be argued that the lack of adequate financial resources, retractions in health policy, the reactions of the insurance funds, inefficiencies in public administration and the absence of serious monitoring mechanisms and feedback were some of the reasons why the health system has faced crisis so soon. Undermining or canceling the fundamental principles of equality, universality and effectiveness which were inspired by Law1397/1983, caused discontent among users of health services in Greece, according to a report by the Organization for Economic Cooperation and Development OECD that was published in 2010 (European Commission, 2010).

The change in the epidemiological profile of Greece has to do with an aging population that creates needs that were not so intense as they were 50 years ago. It is taken for granted that the political factor has created a very expensive and particularly ineffective heritage, the change of population and of transporting data and also the current economic situation in combination with the low efficiency of hospitals resulted in the need of hospitals to reduce costs in the health, the proper management of beds, the reduction of the duration of hospitalization and the rational allocation of human resources, which are some of the issues that are significant for the Greek Health System (Athanassopoulos et al., 1999).

Despite the fact that the modern hospital sector in Europe shows decreasing in the number of hospitals and beds, according to data (OECD) in Greece, there has been an increase in general hospitals and acute inpatient beds in recent years (Tsavalias et al., 2012).

The heterogeneity is observed between the Regional Health Authorities of the Greek Territory related to the number of hospitals and health centers, the number of clinics and beds per department and as well as the different perceptions of the respective boards of directors on management issues in the areas of health which, differ from European standards, in consequence, there are major problems with the efficiency of hospitals, because effectiviness is the main means of the control and rational allocation of human and financial resources (Boutsioli, 2011).

In international literature, however, there are not several studies before and after hopitals mergers through which the assessment of efficiency could be done correctly. Even so, Greece is heading for the restructuring of the health system with hospitals mergers, parts and beds by saving resourses according to the cost-benefit analysis. It is considered to be necessary that in many countries the reduction in the number of hospital beds is accompanied by an increase in their occupancy rates, while the occupancy rate of therapeutic beds came at 76% on average across OECD countries in 2009 (Alexopoulou, 2013).

Additionally CEO of the Massachusetts General Hospital, the executive vice president of the University of Pennsylvania, the CEO, the vice president for health sciences and dean of the medical school, the College of Physicians and Surgeons of the University “Columbia”, and senior Vice President and CEO of Alexandria Children’s Hospital argue that the Merger supports an important strategy for leaders of academic medical centers who seek to develop the health system for their institutions. The factors of success for the implementing of mergers of university hospitals are after all their personal experience, which includes effective leadership in the fields of creativity and confidence, managing uncertainty, ensuring the stability of the medical staff and bridging cultural differences between organizations. The importance of success plays an important role in the evaluation of management, organizational and individual dynamics when large university hospitals are merged. (Their et al., 2014).

The University "Carnegie Mellon" of the United Kingdom, argues that mergers between private hospitals often produce little benefit. Despite this fact, the UK government has pursued an active policy of mergers in hospitals, arguing that consolidation will bring improvements for patients, if it is taken for granted that mergers reduce the field of competition among hospitals. (Gaynor et al., 2011).

In a recent published study that was conducted in America it is argued that for autonomous hospitals, the merger may be the only option to remain viable in the emerging new system of the country's healthcare. (Grauman & Tam, 2012). A disadvantage of mergers in hospitals is the result of the attitude which is held by the boards of the individual hospitals. Proposed to target boards to adopt new business dogmas regarding the risk, pricing, competition, regulation, innovation, and resource management. (Cain, 1982).

In the Netherlands it is argued that the Compulsory health insurance disconnects economic and consumer side of the healthcare markets. The concept of control of hospital mergers is not apparent. Patients do not visit the merging hospitals and they are still affected by changes in prices through their premiums. (Katona & Canoy, 2013).

In Florida and Texas it is argued that the benefits of mergers of hospitals may increase competition through access. (Singer et al., 2012). It is certainly investigated in another study how much the merger of hospitals in Florida and Texas favors officers, which would lead to higher prices by a merger in relation to other competitive hospitals. (Garmon, 2013).

The Possible Causes of Conflicts in the Hospital

It is widely known that any change in a healthcare system and especially when it comes to implementing mergers departments and clinical hospitals, as in this case to reduce expenditure in accordance with the cost-effective, are considered to be the most common causes of collisions between the employees. Usually the changes that would take place are not always welcome, although they are considered necessary for the organization, as they create anxiety, insecurity and reactions from employees (Sullivan & Decker, 1988). Despite all the insecurities, the manager should be able to solve problems, to manage the conflicts that will be created with proper communication, which if they are not treated in time, they can even disorientate the operation of the entire Organization (Forte, 1997; Stathopoulou, 2006).

Many, of course, are the factors that are considered causes of conflict within the Hospital. Different goals, competition, poor communication and misunderstanding of information, disagreement on performance standards and disagreements with the organizational structure being some of them (Montana & Charnov, 2002).

Some of the causes of conflict listed in the expretion event of discrepancy, due to issues such as: a) the validity and enforcement (Richardson, 1991) b) working conditions-increased levels of stress, c) denial of responsibility, d) overlapping roles and responsibilities because of the problematic definition of tasks, e) the different levels of education (Jameson, 1999), f) the defiant attitude to leadership, discrimination (Singleton et al., 1998) and i) the complicated working environment (Bourandas, 2002).

The following list shows the sources of conflict and related issues that are the focus.

- Personal Differences Perceptions and Expectations
- Informative Insufficiency Misinformation & Deception
- Incompatibility role Goals and Objectives
- Environmental Stress Rarity of Resources & Uncertainty
- Source: Whetten and Cameron (1991)

Consequences of Conflicts

Conflicts can have both negative and positive effects in an organization. Most people initially have the impression that the conflict is bad or malfunctional. This occurs because the conflict shows that something is not right or that there is a problem that needs to be solved and therefore, the conflict seems to have disastrous consequences. When a collision occurs, its consequences often lead to further conflict and, thereby, a vicious cycle feedback of conflict is created (Cherrington, 1989).

The negative consequences that are possible to exist, including the procedures or upcoming changes associated with the devastating conflict and are as follows:

- The appearance of cases of inappropriate behaviors from health professionals (Stathopoulou, 2006).
- The division of labor relations and the creation of tension, when it is accumulated that can lead to new conflicts in the future (Gerardi, 2004).
- The increase of stress of health professionals (Stathopoulou, 2006).
- The reduction in the efficiency of employees, since collaboration and teamwork, which are needed to achieve common goals, are hit (Davis & Newstrom, 1989).
- The decrease in the morale of employees (Stathopoulou, 2006).
- The emotional loading of those who are involved (frustration, anger, disappointment) and the escalation of the conflict (Lewicki et al., 2004).
- The reduced and poor communication between/of the dissidents.
- The form of communication, which probably exists between those who are involved, is part of an effort to overcome, to reduce or to reverse the side of a view from another or even to emphasize previous arguments of its own side (Lewicki et al., 2004).
- Rigid commitments. The two sides are stable and firm in their positions even more stuck to their positions, by accepting challenges from the other side. They do not recede because of fear of losing their prestige or being ridiculed (Stathopoulou, 2006).
- High cost. The conflicts that are difficult, complicated, unresolved, last longer or become more and more intense, they produce great cost both for employees and for the organization (Davis & Newstrom, 1989). This cost includes probably expenditure for jury, loss of wages, reduced productivity, physical and emotional injuries (Ury et al., 1993). The loss of time and energy is taken for granted when the stressful situation of conflict is personified and becomes obsession for who are involved in. It is also rational that the negotiation process is more time-consuming than a simple administrative decision. It has been estimated that a head consumes 20% of the time for conflict management and this, by itself, represents a significant loss of time (Torrington et al, 2009).

The positive effects of conflict include:

- The avoidance of stagnation and apathy. The agitation, which may be caused by the conflict, makes individuals be active, participate in procedures and stop them from being inerted (Papadopoulou, 2009).
- The contribution to organizational change and to adaptation (Zavlanos, 2002).
- The increase in the productivity of employees and the improvement of performance of the organization (Zavlanos, 2002).

- The emergence of problems that need to be faced (which probably were not obvious) and the dialogue which arises from the situational awareness so as to find solutions (Davis & Newstrom, 1989).
- The increase in creativity and the introduction of innovation in the organization, that has as a consequence the organizational development (Zavlanos, 2002).
- The personal development and maturation of those who are involved in the conflict management process. The better self-awareness and a deeper understanding of others is promoted, through the process of "fermentation" (Stathopoulou, 2006).
- The stimulation of employees by in participating in the decision-making processes. The people who are involved in when the conflict is resolved, feel more committed to the outcome if they are involved in solving it (Davis & Newstrom, 1989).

Conflicts Between Doctors and Nurses

According to the results of the study of Casanova et al (2007) professional respect is necessary for successful communication. The conflicts between doctors and nurses are the result of a different way of working, in which nurses focus on teamwork while the doctors attribute to themselves a dominant role in providing care. Consequently, a negative climate is created that easily triggers negative behaviors, thereby affects communication.

Schmidt & Svarstad argued that teamwork through effective communication in the field of hospital improves clinical outcomes, increases patient satisfaction and contributes to the reduction of the costs in human and material resources (Schmidt & Svarstad, 2002).

Vazirani et al (2005) report that the dominating pattern of behavior of the doctor to nurse affects negatively the communication between them. This fact is attributed to the different working philosophy, responsibility and education. The majority of doctors are informed by nurses for the condition of the patient. Also, as Reader et al (2007) argue effective communication in the hospital, especially in the Intensive Care Unit ensures effective cooperation and subsequent treatment efficacy.

According to the results of the study of Puntillo & Mc Adam physicians were more optimistic in the information of patients and less clear, precise and realistic in prognosis of the disease. They were using constantly medical terminology, they were removing early from the patient and they were avoiding family, and as a result there were not having good communication between doctors-nurses-patients. At the same time, they were allowing nurses to explain the details, but they often ignored their views.

The health care system requires from nurses to communicate successfully and be effective both in providing care, reveling information and also relate with physicians (Puntillo & Mc Adam, 2006).

Today, the communication of physicians with nurses plays an important role in providing care in which modern nurse coordinates the activities of all members of the interdisciplinary team and informs them adequately. In conclusion, effective communication and the conflicts which are caused among health professionals is prerequisite for the safe management of patients. The final outcome is determined by the abilities of each manager and the application of appropriate crisis-handling methods by the Agency.

Management of the Conflicts

The management of a conflict starts with the decision whether and when someone will intervene to resolve it. This happens when disagreements are insignificant especially when they appear between

two people and it is better to settle between the two parts that are involved in. If it is allowed to the two sides to resolve their own disagreement, this may be an experience of development and improvement of their skills for resolving disputes in the future. But when the disagreement can lead to significant negative effects, then the head must immediately intervene. Sometimes the intervention can be deliberately postponed, so as to leave the dispute to escalate, because the increase in the intensity can motivate participants to seek an acceptable decision. Also, the entrust to the two sides of a common task in a conflict can help and especcially a task that is not directly related to the dispute and can help one side understand the other (Stathopoulou, 2006).

The conflict management is a process that necessitates time and energy. The management of health organizations should be interested and be committed to resolve any dispute, by showing willingness to listen to the positions of all parts, so as to find common solutions. Conflicts in the business area usually involve disputes over real facts, for procedures or rules for values and objectives or formal and informal cultures. The overlapping responsibilities, poor communication among departments of an organization, the declared and undeclared ambitions, lack of teamwork, inadequate leadership, the system of remuneration and penalties may be responsible for the polarization of people or groups (Papanis & Rondos, 2005).

In surveys that are conducted in the Greek business reality has shown that conflicts are more common when job satisfaction is low, the incentives to work are utilitarian, the culture of the company is hierarchical and education is of lower importance. In the light of an external threat such as the merger of an organization, the understanding of the kind of conflict helps to the awareness of its degree complexity, in flexibility, which is needed to vent, to the type of communication to be developed for the smoothness of differences and to the deep investigation of the causes. (Papanis & Rondos, 2005).

Additionally the National Health Policy should identify the real targets on how to avoid conflict over hospital management systems, to have legislative competence to validate the expectations that the senior management (governmental and non) have. Consequenclty the Ministries of Health, Education, Labour and Finance will be coordinated through intensive training programs for managers, Physicians Public Health staff, general practitioners, Epidemiological studies, Structure of society so as to be viable to the fulfilment of changes without this burdening patients and the effectiveness of the organization (Koutis, 2011).

Conflict Management Strategies

There are different ways for a conflict to be dealt with. However, there are three main categories of conflict management strategies which are: a) the Win-Lose Strategy, b) the Win-Win strategy and c) Lose-Lose Strategy (Runde & Flanagan, 2007).

In addition, the individual strategies for dealing with conflicts are:

- **The Method of My Way:** In this method a situation which is difficult to be maintained is created. In this case the one side uses its power against another to force it to agree with her. This method belongs to the category of Win-Lose, which means, that they will definitely find a solution to the problem but it is not the best. This method is only necessary in emergency situations in which the leader must take a decision immediately (Janssen & Van de Vliert, 1996).
- **The Method Your Way:** For the application of this method the two sides that have been clashed must be followed. One of its basic features is the degradation of the differences from both sides resulting in compromise (Jameson, 1999).

- **The Method Half Way:** This method aims to compromise the two sides so that there is neither loser nor winner at the end of the conflict. All the concerned issues that differentiate the two sides must meet in the middle in order to reach a compromise. The disadvantage that the compromise has is that is not considered a solution of Win-Win strategy but a proposal Lose-Lose. Both sides think that they gave many or that they took few without giving special attention to the result (Runde & Flanagan, 2007).
- **The Method Our Way:** It is considered one of the most successful methods. It offers long-term solutions to the problems and belongs to the category of Win-Win strategy. The reason why it is not used as often as it should, is that it takes much time and effort. This method is ideal but in real conditions it cannot often be applied. This happens because of time and delvation of the real causes that led to conflict (Runde & Flanagan, 2007).

It is mentioned that there is not more appropriate way of negotiating a collision. All management styles are useful and effective, according to the circumstances by assuming and understanding of the impact of the conflict and the costs will have on the organization (Jameson, 1999).

However, avoidance of dealing with a conflict represses anger or indignation and consistently results in greater. Being aggressive may be useful to end an offensive behavior or to end of a relationship. Therefore it is important for someone to understand what his or her personal style is and to recognize his or her limitations (Wilmot & Hocker, 2001).

Strategies for Conflict Resolution

Depending on the degree of claimance and emphasis on collaboration, some conflict resolution strategies are distinguished in accordance with the model conflict model. (Thomas, 1992). This model has already been used in previous research in the hospital and is internationally considered as a study tool of how to resolve conflicts (Valentine, 2001). According to this model, five types of conflict resolution techniques are distinguished (Hendel et al., 2005):

- **Avoidance:** The individuals who are involved in a conflict avoid to face the problem that leads to conflict. People that take part in the conflict remain neutral, ignore friction and they do not take any kind of action. This strategy is suitable for situations in which the subject of the conflict is trivial or the expected benefit from the resolution of the conflict is not commensurate with the costs and does not outweigh the effort that must be done. Also, if one of those who are involved in is stronger than the other or if the necessary amount of time to deal with the problem does not exist.
- **Accommodation-Retreat:** When this strategy is followed, one side retreats to satisfy the other. This strategy is usually applied in cases in which the maintenance of good relations is considered more important than the issue of conflict and the retreat is presented as a good act. It is a way of self-sacrifice which is not assertive and does not conduce to cooperation.
- **Compromise:** Both sides sacrifice something in order to reach agreement, and both find solutions that satisfy some of the needs of people. It is about an appropriate strategy when it is necessary to provide a temporary solution in a short time, when both sides are equal, or when there is strong interest of each person who gets involved in a different aspect of the problem.

- **Competition:** One side tries to satisfy its aspirations on the other. A person uses the power and authority which are conferred on from his or her position to force others to accept a specific solution. It can be used when one side has the knowledge and ability to take a right decision by itself and in emergency situations when a quick decision is required. It is usual between those who are involved in and there is a current-head relation.The strategy of competition, although it provides short-term benefits in the long run may prove detrimental to cooperation and labor relations, because during the implementation of the strategy emotions are generated.
- **Collaboration:** The two sides work together so as to find a solution that it would be satisfactory to both sides. Both try to reach mutual benefits while satisfying their needs. This process takes a lot of time and energy, so it is preferable to be used in important issues that deserve the payment of all this effort (Hendel et al., 2005).

Conflict Resolution and Emotional Intelligence

The conflict permeates most organizations. The Management and generally the Manager can handle those who are involved with proper management, organization and emotional intelligence. The researchers argue that the conflict management is signigicant to the effectiveness of the organization (Lemieux - Charles, 1994).

Resolving the conflict is more feasible when it is tried in the bud. As the treatment delays and as more people get involved in, the dynamics of access turns into knot and the flow of information and misinformation becomes chaotic (Papanis, 2011).

According to Daniel Goleman (1997) emotional intelligence is “the ability to recognize their own feelings and those of others and can effectively handle his emotions and interpersonal relationships.” It is true that emotion can be an important source of information and a valuable tool in the proccess of prevention and resolution of conflicts. The shift to emotional intelligence about organizational problems during the last few years is due to the implementation of the work model in groups and secondly to globalization (Goleman, 1998).

According to the results of a major investigation into American companies for the skills considered essential for success, 85% of superiority and success of individuals in the higher hierarchy levels is due to their emotional abilities. The high EQ of a leader contributes to the formulation of a more fertile working environment, where employees work for the achievement of goals, giving their best. (Goleman, 1995).

For a manager, the Emotional Intelligence is concidered a skill which can increase personal effectiveness both in personal and in professional level. Developing communication relationships and trust with colleagues and subordinates, the leader improves his social image, while he or she collects emotional information that will help him or her during the decision making process.

Benefits of the Conflicts in the Workplace

Despite the fact that the conflict is a word that generally has a negative meaning, this is not correct. Conflicts can be very useful for the generation of new ideas, stimulation of creativity and also to be able to bring people closer (Ritsema Van Eck & Huguenin, 1993).

An organization without conflicts is characterized without any change and with few incentives for employees. An optimal amount of conflict will generate creativity, resolution of problems in the atmosphere, a strong team spirit, motivation and therefore changes. When conflicts become abundant, the organization

will show a loss of energy, reduction of productivity, increased anxiety and, finally, disintegration. So, we must realize that conflict can be helpful and that are inevitable when people work together, but also they can destroy an organization. According to Williams (1998), benefits can be achieved only if the dealing of the employees "Top Manamement" before or after the process of merging is done in such a way so as to obtain their loyalty, in order to optimize the quality of providing health services (Williams, 1998).

An excess of conflicts is an indicator of the failure of leadership. Therefore, the dynamic of conflicts should be understood by knowing their handling in a way so as to become fertile (Schijndel van Strack & Burchardi, 2007).

CONCLUSION

Conflicts are a natural and an inevitable phenomenon, particularly in health services. It is impossible to be eliminated, but according to modern principles of management science, this is not desirable. The management of conflicts is primarily an administrative process, which is an important aspect of organizational activity.

The current wave of mergers is mainly a reaction to a competitive environment, which gives more emphasis on control of cost. The development of managing care has come under considerable pressure on healthcare providers. The success in organizing the merger requires focusing on two crucial elements: a) the clarity of the objectives of the merger and b) how the process itself will be managed and will be communicated to the employees.

The success of this project requires sophisticated management as it should be carefully supported from a considered policy management personnel preventing in that way the nascent labor conflict.

For the proper function of the hospital and the parts that were going to merge, the manager is required to enhance the interconnection of personnel departments by providing proper guidance and information as well as to contribute to the improvement of communication with the holding of regular meetings among the directors, the heads of departments and their subordinates.

The Mergers will be right to act only when there are convincinctive arguments when the potential benefits outweigh the costs of making the change on important providing human services.

Mergers may be the result of either the needs to reduce operating costs or to revise the organizational structure of the NHS in light of new management models imposed both by the evolution of technology and by demographic changes. In any case it must be ensured the improvement of the efficiency and quality of services provided through the therapy of bad situations and the forecasting emergency situations. To do this it requires:

- Manager selection with experience in the management of hospitals, with specific qualifications required by the responsibilities of the position (management staff from different disciplines and incentives, patient handling etc.) with a developed emotional intelligence to normalize extreme situations resulting from the increased stress of the medical and nursing staff.
- Use of business models concerning time optimization, operating costs and forecasting changes
- Management of conflicts exacerbate the forced movement of staff at best and layoffs at worst in the case of mergers

- Development of accompanying outpatient services to meet needs arising from the reduction of beds (home care etc.)
- Rationalisation of operating costs and primarily the supplies.

Considering that the concept of total quality mainly refers to the satisfaction of both the provider and recipient of services, we consider it essential to develop and implement barometers of satisfaction that will be updated periodically through repeated measurements with emphasis on mapping of pre- and post-merger situation.

There must be found ways to obtain information on the benefits of merging organizations in NHS about how the process of the merger must be managed. The evidence elements can then be used by the leaders of this change, both for national policy makers and for local councils and organizations.

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KEY TERMS AND DEFINITIONS

Conflict: The conflict is a disagreement between two or more individuals or between individuals and groups or between groups, which begins when one individual or group perceives that the other side seeks to prevent or block the aspirations and interests.

Contact: Transmition of messages from one person to another or from one group to another, in order to accept and understand them. An interpersonal relationship in which you send and receive messages through symbols and gestures. The messages may be specific information, opinions, feelings.

Cooperation: For someone working jointly with another or others, (the development of mutual relations between individuals and groups that are designed to achieve common objectives) These people use information together, work together in teams and managing projects.

Emotional Intelligence: It is the ability to control your desires, to regulate moods of others, feeling isolated from thought to fall into each other's position and to hope.

Empathy: The ability to recognize the feelings of others and behave accordingly.

Group: Number of people in a particular place and time develop relations between them and experiencing common emotional experiences, realizing that they are a total that pursues specific goals.

Social Skills: The ability to communicate with other people and to provoke any reactions wanted.

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Chapter 23
Framework of Indian Healthcare System and Its Challenges: An Insight

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ABSTRACT

India, one of the oldest civilizations and second most populous country is ethnically, linguistically, geographically, religious, and demographically diverse is poorly ranked due to complex public healthcare system, which suffers from insufficient funding, poor management. Poor health intertwined with poverty, affordability, accessibility, burden of infectious and non-communicable affecting lives of most Indians. Healthcare ecosystems are complex and still evolving, investments in service delivery system, infrastructure, and technology, are still being experimented and explored. India's booming population; increasing purchasing power; rising awareness of personal health and hygiene; and significant growth in infectious, chronic degenerative, and lifestyle diseases are driving the growing market. In this chapter we will explore accessible and affordable healthcare system, state of public healthcare, healthcare reforms, governance (Constitutional Provisions, Law, and Policy framework) in healthcare delivery, and Opportunity offered by market drivers.

INTRODUCTION

India is a highly heterogeneous country in ethnicity, religion, and language. It is also diverse in its demographics, given the presence of an extremely large rural population. The country covers only a little over 2 percent of the earth's land surface, yet its population is approaching 20 percent of the world total. Because of its scale, strengths, and vulnerabilities, the future of India and its ability to safeguard the health and wellbeing of its citizens raises issues of importance to the entire world community. The growing demand for quality healthcare and the absence of matching delivery mechanisms pose a challenge as well as opportunity for healthcare service providers, to design and engineer a sustainable healthcare system with customizable delivery formats to benefit demanding and health conscious Indian population (Sreenu, 2011).

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The relationship between health and poverty or health and development is complex, multi-faceted and multidirectional. Notwithstanding sixty-eight years of existence as an independent republic, large sections of the Indian population do not as yet have reliable and affordable access to good quality healthcare. This is because of poverty, which in its various dimensions could be a manifestation, as well as a determinant of an individual's health. In its most basic form — as a state of food deprivation and nutritional inadequacy — poverty has a direct bearing on the morbidity and longevity of people.

Defining health has become more complex and diversified than ever before as it does not have much to do with the state of having a disease, or absence of it, but it is to do with a person's integrated ability to perform and function efficiently with a productive value conducive to the well-being of self, his family, and society at large. This notion also correlates with the definition of health given in preamble of constitution of World Health Organization (WHO), which states that "*Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*" (WHO, 1948a). Attainments on other dimensions of human development, especially educational and economic wellbeing, reinforce the transition towards better health and longevity.

Further the idea of integrating health to a duo of a disease free state and a sound social, psychological, and spiritual combination was recognized as early as 2000 years ago, when Sushruta who lived between 600 to 1000 BC (a surgeon and teacher of Ayurveda) compiled the medical treatise "Sushruta Samhitain" containing multiple detailed references to diseases and medical procedures in Vedic Sanskrit. He is also considered to be the 'Father of Surgery' who defined health as a physiological balance added with psycho sensual happiness (Shasthri, 2007). Sushruta goes further to state that health is also affected by one's moral, social, and spiritual values. Ayurveda holds that Dharma (spiritual gains), Artha (monetary gains), Kama (sensual gains), and Moksha (liberation), the four primary objectives of human life, are possible only for a healthy human being. This is possible when ideal healthcare system as defined by Ayurveda is one which cures a disease without causing or precipitating other illnesses (Tripathi, 1983). In today's era, healthcare covers not merely medical care but also all aspects -preventive care too. Nor can it be limited to care rendered by or financed out of public expenditure within the government sector alone but must include incentives and disincentives for self-care and care paid for by private citizens to get over ill health.

STRUCTURE AND RESOURCES OF HEALTHCARE SYSTEM

The structure of India's healthcare system is multifaceted, consisting of various types of providers practicing in different systems of medicine and facilities, and within federal structure. There are about 600000 hospital beds in more than 13550 Hospitals; 27400 Dispensaries; 717860 Registered Medical Practitioners; 295000 Nurses; 227000 Auxiliary Nurses; and Midwives. This includes multi-layered rural healthcare system having District hospitals usually with bed strength of over 300 beds located at district headquarters, Sub-district hospitals usually with bed strength of 100-300 located at divisional headquarters in each district, Community Health Centre (3043 in no.) is a 30 bed hospital, acts as a referral unit for four Primary Health Centres (PHCs), and each Primary Health Centre (22842 in no.) is a referral unit for six sub-centres has around 4-6 beds. Sub-centre (137311 in no.) is the most peripheral contact point between the PHC and the community.

The central government policies, though well-intentioned, have mostly failed to deliver intended outcomes, as under the Indian Constitution, health and family welfare has been identified as a State subject. The main responsibility of infrastructure and manpower building rests with the different State Governments. The states spend more than 80 percent of the total expenditure on curative cure. The Central Government spends more than 70 percent of the total expenditure on preventive and promotive health care. These decisions have introduced policies and fiscal incentives that have inadvertently enabled states to prioritize medical services and single-issue programs over broader public health services, and reduced the capacity of the public health workforce to deliver public health services.

Persistent gaps in manpower and infrastructure, with wide inter-State differences, especially at the primary health care level, disproportionately impacts less developed rural areas. This is due to low public spending on health, rural healthcare infrastructure is ailing or severely depleted were nearly three quarters of Indian population resides. The Primary Healthcare Approach was never implemented in its full form as it was considered too idealistic and expensive, and it was replaced with disease focussed selective model. Thus selective vertical programmes were pushed as a substitute for comprehensive health system development as it has not responded adequately to the interrelationship between health and socio-economic development. It only indicates than the approach to development of health sector in the country has not been sufficiently integrated with the overall process of development. What India needs is a healthcare system that can meet the demands of over 1.28 billion people, most of whom are unable to bear the burden of rising healthcare costs. Thus the federal structure has impacted healthcare policy in such a large, diverse, and fragmented country leaving healthcare system in disarray.

According to Mann, et.al., WHO recognizes health as a human right and the common denominators for ensuring social well-being (as cited by Golechha, 2015), however combination of poor social policies, unfair economic planning, and bad political mechanisms over a period had led to inequality, social stratification, socio-economic disparities based on visible circumstances of people's lives -. their access to healthcare and education, their conditions of work and leisure, their homes, communities, towns or cities, and - their chances of leading a flourishing life (WHO, 2008b).Therefore impact of healthcare system on population derives from social determinants like living conditions, nutrition, safe drinking water, sanitation, education, early child development, providing financial security using social security measures etc. Together, the structural determinants and conditions of daily life constitute the social determinants of health. Lack of adequate progress on these underlying social determinants of health has been acknowledged as a glaring failure of the Indian healthcare system.

CURRENT HEALTHCARE SCENARIO

India encapsulates a paradox; its relatively unimpressive performance in healthcare despite high economic growth of 7 percent. India's public health expenditure is currently 1.26 percent of GDP is very lowest among BRICS countries and far less from the WHO recommended level of 5 percent. Continuous budgetary cuts and neo liberal policies meant that private sector spending on health as a percentage of GDP is higher than that of public sector. The Government (Central and State Governments combined) expenditure on health was 1.36 percent of the GDP, as a percentage of total expenditure, the expenditure on health was 4.8 percent, as per social services expenditure, the expenditure on health was 19.2 percent as per budget estimates in 2012-13.

As per the (World Health Statistics 2011), in case of India, the total expenditure on health as percent of GDP was 4.6 percent in 2000 this came down to 4.2 percent in 2008. The government expenditure on health as percentage of total expenditure on health was 27.5 percent in 2000 which rose to 32.4 percent in 2008. The out-of-pocket expenditure as percent of private expenditure on health was 92.2 percent in 2000 which reduced to 74.4 percent in 2008. The draft National Health Policy, 2015 has proposed target of raising public health expenditure to 2.5 percent from the present 1.36 percent of GDP. The consequences of low public spending and poor access to public healthcare facilities, and the burden of high health costs is felt disproportionately by the poorest income class resulting in a huge out-of-pocket (OOP) expenditure, pushing 40 million people below poverty line every year (Ramachandran, 2015). The unequal geographic distribution of doctors and lack of hospitals infrastructure makes it difficult for low-income families to seek treatment and access quality medical facilities, leading to delays and aggravating health problems.

The proposed Universal Health Coverage (UHC) includes provisions for 50 free essential drugs, health coverage for the poor and competitively priced premium health insurance for all. In simplest terms UHC means access to quality, effective and affordable health services for all, without imposing financial burden (O'Connell, Rasanathan & Chopra, 2014). Notwithstanding the goals of UHC in the 12th plan document, the government had reduced its role to merely providing preventive aspects like immunization and practically handing over all clinical part to unorganized private sector which provides 80 percent of healthcare services. Thus the phase of privatization and liberalisation of economy in 1990, has witnessed staggering health inequities, resurgence of communicable diseases and an even more unregulated drug industry with drug prices shooting up, adding up to the current crisis in public health. Along with the retreat from the goal of universal access, special health needs of women, children and other sections of society with special needs have become further sidelined or are inadequately addressed.

Every healthcare system however old or developed has its own advantages and limitations considering the diversified needs of rural, sub-urban, and urban populations. India needs to focus on giving equitable access to all by overcoming inequity based on religion, caste, and gender. There is also questionable efficiency and distrust in much of the public healthcare system, as it is crippled with inadequate funds, poor surveillance of health programs, lack of trained manpower, and other resources. The Ministry of Health and Family Welfare (MoHFW) can play a crucial role in guiding India's public health system by regulating clinical establishments, professional and technical education, food safety, medical technology products, research, clinical trials, implementation of policies and health related laws. Each of these areas needs urgent reforms which will entail moving away from reactive, voluminous, poorly implemented regulatory regimes, cobbled up in an ad-hoc manner to a more effective, rational, transparent and consistent regime (MoHFW, 2014a). Healthcare must be made a core priority for the next decade, to enable transformation of the healthcare system, while promoting pro-health policies in other sectors.

The largest gains in health status will come from preventive measures (Joumard & Kumar., (2015). Integration of traditional practices and home remedies with modern advancements in healthcare technology and associated services will be key differentiator. However we need to protect our highly diversified traditional healthcare systems without devaluing or delineating the essential framework on which it rests. There is every possibility where one system may work better than another under certain conditions which can be further improved by utilization of traditional skills in combination with the innovative technological breakthroughs made by the modern science (Alex, 2005) resulting in development of healthcare system which just ideal.

Determining the right mix of factors like *Availability* (what type of services exists), *Accessibility* (how they can be reached), *Adequacy* (does it meets consumers' requirements), *Affordability* (what is direct and indirect cost), *Acceptability* (does providers explain treatment with empathy) and balancing it will appropriate resource allocation will determine the success or failure of healthcare system in India. Thus government and the society have to make concerted efforts together for improving the quality of life of people by redefining the health system on three key dimensions of health delivery: *Access, Cost,* and *Quality*.

The rise in the number of vehicles on the road and chaotic behaviour of drivers has resulted into increase in accidents, injuries, and road fatalities which are amongst the highest in the world. A National Crime Records Bureau (NCRB) report revealed that every year, more than 135,000 traffic collision-related deaths occur in India. Road traffic injuries are the sixth leading cause of death in India with a greater share of hospitalization, deaths, disabilities, and socio-economic losses in the young and middle-aged population (MoHFW, 2004b). Road traffic injuries also place a huge burden on the health sector in terms of pre-hospital, acute care, and rehabilitation (Gururaj, 2006). The nonexistence of "911" like system, poor public awareness of the Emergency Medical System (EMS), inadequate availability of right equipment's at emergency and trauma centres has placed big burdens on a healthcare delivery system in India. In most cases people help themselves during times of emergency as the current emergency response system is not appropriate. It has been observed that people call up emergency number, normally police helpline 100, only to get diverted to other departments, which delays response time. The Ministry of Home Affairs has also been pushing for a single emergency helpline number (police, fire, medical and other kind of emergencies services) in India in its bid to prepare effective and timely response in event of emergency.

As India seeks to become a global power, there is perhaps nothing more important than the health and well-being of its citizens. This is ensured in part through an effective, comprehensive healthcare system which needs to be strengthened further. The National Rural Health Mission (NRHM) and Rashtriya Swasthya Bima Yojana (RSBY) launched by the Government of India is a forward step in establishing effective integration and convergence of health services, reducing the out of pocket spending on tertiary healthcare, and affecting architectural correction in the healthcare delivery system in India. Health profiles published by the government should be used to help communities prioritize their health problems and to inform local decision making. Primary healthcare should be prioritized, since it is the greatest need of the vast majority and, if effectively delivered, will substantially reduce the demand for secondary and tertiary care. At the same time the government should come up with policy for improving the health status of the urban poor by adopting effective, efficient and sustainable strategic intervention approaches.

With severe shortage of qualified human resources for healthcare delivery, the public health facilities continue to face staff shortage as over 85 percent specialist doctors, 75 percent doctors, 80 percent laboratory technicians, 53 percent nursing and 52 percent ANM (auxiliary nurse midwife) posts are vacant across States (Nandan & Agrawal, 2012). Further health research activities do not match with public health priorities, which is necessary for better health outcomes. Government should make research initiatives more interactive with policies and implementation of health programmes for making health research more relevant to health system and policy. Also there is a need for strengthening research infrastructure and capacity building in the departments of community medicine in various institutes and to foster their partnerships with state health services for effective health outcomes.

Health Transitions

Rapid economic growth, coupled with rapid growth of middle class, is directly responsible for increased 'healthcare innovation', 'healthcare promotion' 'healthcare consumption' and 'health transition'. Healthcare innovation can be defined as "the introduction of a new concept, idea, service, process, or product aimed at improving treatment, diagnosis, education, outreach, prevention, and research with the long term goals of improving quality, safety, outcomes, efficiency, and costs" (Omachonu & Einspruch, 2010). Healthcare industry is experiencing a steady and stable transformation the world over, majorly with Information Technology (IT) playing a primary role in every aspect of healthcare value chain ensuring faster adaptability of advanced technologies, reduction of service costs and provision of quality healthcare at affordable prices. IT is increasingly penetrating the healthcare service delivery in India as well, driven by the need to reduce costs, efficiency imperatives, interoperability of existing fragmented hospital systems and increased health awareness among citizens. The technology shift has cast itself over the field of healthcare, bringing with it a digital transformation in the way doctors and patients interact. However adoption of same has been restricted due to factors like affordability, knowledge about its clinical utility, distribution, service, funding etc.

Within the context of health promotion, health has been considered less as an abstract state and more as a means to an end which can be expressed in functional terms as a resource which permits people to lead an individually, socially, and economically productive life. Health promotion is defined as "a process for initiating, managing, and implementing change, a process of personal, organizational, and policy development" (Kickbusch, 1994). It can be achieved by actionable strategies like building healthy public policy, creating supportive environments, strengthening community action, developing personal skills, and re-orientation of health services. Revival of public health regulation by the government is possible through updating and implementation of public health laws, in consultation stakeholders and increasing public awareness of existing laws and their enforcement procedures must be implemented universally across the country. India needs to reshape the paradigm of care by creating a culture of health and wellness. The National Accreditation Board for Hospitals & Healthcare Providers (NABH) defines wellness as "a state of a healthy balance of the mind and body that results in overall well-being". As per a recent study by the Stanford Research Institute International, Indian wellness industry valued at USD 9.8 billion is less than 2 percent of the global wellness industry valued at USD 2 trillion.

The new agenda for Public Health in India includes the epidemiological transition, demographical transition, environmental changes and social determinants of health. Yet the slowness of India's demographic and epidemiological adaptation means that at the beginning of the 21st century the nation's population is still challenged by a high prevalence of infectious disease, alongside an already large and growing non-communicable illness burden. The complex range of factors that interact to determine the nature and course of this epidemic needs to be understood in order to adopt preventive strategies to help developing societies like India deal with these burgeoning problem Non Communicable diseases (NCDs) (Shetty, 2000). Major healthcare transitions are described below.

Shifting Demographics

India continues to be in the middle of its demographic transition. It justifiably claims to be the first country to adopt an official policy to slow population growth, beginning with the country's first Five Year Plan in 1952 (Jain, 1998). The first National Population Policy (NPP) proposed in 1976, contained

a comprehensive socio-demographic program covering 14 topics such as reducing infant and maternal mortality, banning child marriage, universal immunization of children, and preventing the spread of HIV. The National Population Policy, 2000 affirms the commitment of government towards voluntary and informed choice and consent of citizens while availing of reproductive health care services, and continuation of the target free approach in administering family planning services. It is based upon the need to simultaneously address issues of child survival, maternal health, and contraception, while increasing outreach and coverage of a comprehensive package of reproductive and child health services by government, industry and the voluntary non-government sector, working in partnership (National Population Policy, 2000).

With population of nearly 1.28 billion, India represents almost 17.31 percent of the world's population, which means one out of six people on this planet live in India (India's Population, 2015). Three factors, namely, a large segment of the population in the reproductive age group; high fertility due to considerable unmet need for contraception; and high desired level of fertility due to prevailing high IMRs have been found to influence the population momentum and, hence, its current growth rate. India is predicted to have more than 1.53 billion people by end of 2030. India's demographic transition is also visible through population pyramids which provide data on a nation's age structure (Trovato, 2009). More than 50 percent of India's current population (Census India, 2011) is below the age of 25 and over 65 percent below the age of 35 offering a demographic '*window of opportunity*' where the growth in the working-age population is greater than the growth in the total population in 2015. This increase in the share of the working-age population in total population is referred to as the '*demographic dividend*' (Bloom, Canning, & Sevilla 2002). If working-age people can be productively employed, India's economic growth stands to accelerate.

As per Registrar General, government of India figures (as cited by Haub, & Sharma, 2006), about 72.2 percent of the population lives in some 638,000 villages and the rest 27.8 percent lives in about 5,480 towns and urban agglomerations. With almost 55 percent population moving to cities by 2050, India is experiencing largest rural-urban migration of the century. Health is instrument of social and economic development. It has resulted in significant improvements of health indicators showing that India is well positioned in its demographic transition.

Statistics released by the MoHFW shows that life expectancy has increased at an average pace of 4.5 years per decade since 1950, pegged at 67.3 years (males) and 69.6 years (females) in 2011-2015. The fertility rate has declined sharply from approximately 6 children per woman in the 1950s to 2.7 children per woman today. Infant mortality rate has experienced a 70 percent decline from over 165 deaths per thousand live births in the 1950s to around 50 today. Maternal mortality ratio has declined from 301 per 100,000 live births in 2001-03 to 212 in 2007-09. With the population growth rate at 1.58 percent (birth rate is 20 births per 1,000 people per year and death rate are 8 deaths per 1,000 people per year between 2010-2014) (World Bank, 2015).

An important concern in the present stage of India's demographic transition relates to persisting adverse sex ratio, defined as number of females to thousand males (approx. ratio is 933/1000 live births). There is a significant variation in sex ratio across states. The sex ratio also varied between the rural and urban areas, as well as among different sections of the society. This points to the possibility of widespread prevalence of pre-natal sex determination and sex selection practices. The government has redoubled efforts to enforce the ban in recent years in the face of growing alarm at the frequency of female feticide (Gender tests, 2006; Neelam, 2006). The National Family Health Surveys (NFHS), a part of the global Demographic and Health Survey (DHS) program, have provided a wealth of information

on a wide variety of socio-demographic topics. The NFHS produce measures of fertility, contraceptive use, childbearing desires, the status of women, infant mortality, immunization coverage, use of iodized salt, reproductive health, knowledge of HIV and AIDS, housing, and other valuable data.

Socio-Economic Transitions

India's society is deeply rooted in religion, language, tradition, and caste system. Demand for qualitative healthcare services will be fuelled by the growing literacy and affluence of the Indian middle-class. Following economic liberalization, India's GDP growth averaged 6.6 percent between 1990 and 2010. As a result, the incidence of poverty was nearly halved from 51.3 percent in late 1970s to 28.6 percent in late 1990s. India has the largest illiterate population in the world and the literacy rate of India as per 2011 population census is 74.04 percent, with male literacy rate at 82.14 percent and female at 65.46 percent (Lawton, 2014a). Notwithstanding the diversity of this experience of change, one can also say rather confidently that there would be hardly any pocket of India today that has been left untouched by the process of development and democratization.

However, despite the economic growth, resultant increase in personal incomes, and collected tax revenues, India is the only country which has seen a fall in public spending on healthcare form 4.6 percent in 2000 to 4.2 percent in 2008 as percentage of GDP (World Health Statistics, 2011). To manage budget deficit, central government reduced spending on healthcare failed to benefit the disabled, drug addicts, street children, child labourers, and the poor without extended family. Private sector mostly catered to needs of urban rich and middle class. The Central and State governments combined expenditure on health was 1.26 percent of the GDP as a percentage of total expenditure, 4.8 percent as per social services expenditure, 19.2 percent as per budget estimates in 2012-13, and out-of-pocket expenditure as percent of private expenditure on health was 92.2 percent in 2000 which reduced to 74.4 percent in 2008 (SAARC Development Goals, 2013). The draft National Health Policy (NHP), 2015 has proposed target of raising public health expenditure form current 1.36 to 3 percent of GDP, however it is yet to be realized.

Epidemiologic Transitions

Credits given to the success stories post-independence are far and few. For a country of size and population of India, the emerging infections remain a real and present danger. A meaningful response must approach the problem at the systems level. A comprehensive national strategy on infectious diseases cutting across all relevant sectors with emphasis on strengthened surveillance, rapid response, partnership building and research to guide public policy is needed.

With rapidly changing disease profile (infectious and chronic degenerative diseases) has resulted into an epidemiological transition across its diverse and young population, which is reflected as growing burden of Non Communicable Diseases NCDs like cardiovascular diseases (like heart attacks and stroke), cancers, chronic respiratory diseases (such as chronic obstructed pulmonary disease and asthma) and diabetes especially in rural India (Joshi, Cardona, & Iyengar, 2006). Diseases that have declined in many developing countries continue to be common here. India accounts for 21 percent of the world's global burden of disease (WHO, 2013c). The increasing problem of emerging and re-emerging communicable diseases (drug-resistant TB, malaria, dengue, viral hepatitis, SARS, avian flu, H1N1, Kalaazar, and Japanese Encephalitis) exerts immense pressure on the already overstretched health systems. Many research

studies have shown India stands to lose nearly six percent of its GDP annually due to premature deaths and preventable illnesses (World Bank Report, 2010) and nearly USD 6.2 trillion by 2030 due to NCDs.

NCD's are rapidly increasing in many developing countries, largely due to demographics and lifestyle changes (Lopez, Mathers, Ezzatti, Jamison, & Murray, 2006). With increase in the number of elderly, there will be higher incidence and prevalence of NCDs like Hypertension, Cardiovascular diseases, Obesity, Stroke, Diabetes, Cancers, and the whole range of geriatrics problems. Health service users are facing increasing challenges associated with the prevention and treatment of such chronic diseases (Patel, et. al., 2011). The estimated number of cancer cases in India is two million, seven lakh new cases are detected, and three lakh die due to cancer every year. Various studies put the prevalence of diabetes from 0.95 percent to 3.8 percent in urban areas and 0.6 to 1.93 percent in rural areas of the country. About 40 million are estimated to suffer from coronary vascular diseases, 5.1 million suffer from HIV/AIDS, 14 million suffer tuberculosis, 12.5 million blind (80 percent of this blindness is due to cataract), nearly 60 million suffer from endemic goiter, and an estimated 8.8 million have mental or psychomotor handicap due to iodine deficiency (Kapilasrami, 2000). Significant contribution to these epidemics also resulted from environmental degradation, excessive food adulterations, and toxic contaminants leading to increase incidence of allergic, respiratory, neoplastic, and latrogenic diseases.

In 2004, chronic diseases accounted for an estimated over 50 percent of the 10 million deaths, compared to 37 percent of deaths due to communicable diseases and other disorders. Disparities in treatment for chronic disease are enormous between urban-rural and rich-poor population. Episodes of hospital care for chronic disease are twice those for infectious disease and expenditures on chronic diseases accounted for 45 and 70 percent of average monthly income for the highest and lowest income group respectively. The relative frequency of treatment for lifestyle and chronic illness conditions varies between inpatient and outpatient settings. It is hard to tackle diseases as healthcare is more biased towards curative care, with a significant drop-off in number of patients along the treatment cycle, due to under-diagnosis and inappropriate care.

The rise in NCDs in urban areas will spur an increase in inpatient hospital admissions and related costs. It is projected to account productivity loss of USD 236 billion by 2015. Compounding effect of both trends is longer life expectancy and the growth of the elderly population (Lawton, 2014b). India also has very low coverage to key health interventions like oral rehydration therapy, antibiotic treatment for childhood pneumonia, and immunization. As many as a third or more of the country's children still do not receive the full set of immunizations which is one of the most cost-effective health interventions. Several infectious and vaccine-preventable childhood diseases still contribute 30 percent of the disease burden in India (John, Dandona, Sharma, & Kakkar, 2011). The direct interaction of these two transitions namely urbanization and chronic illness will have enormous effects on India in future.

ANALYZING HEALTHCARE SYSTEM

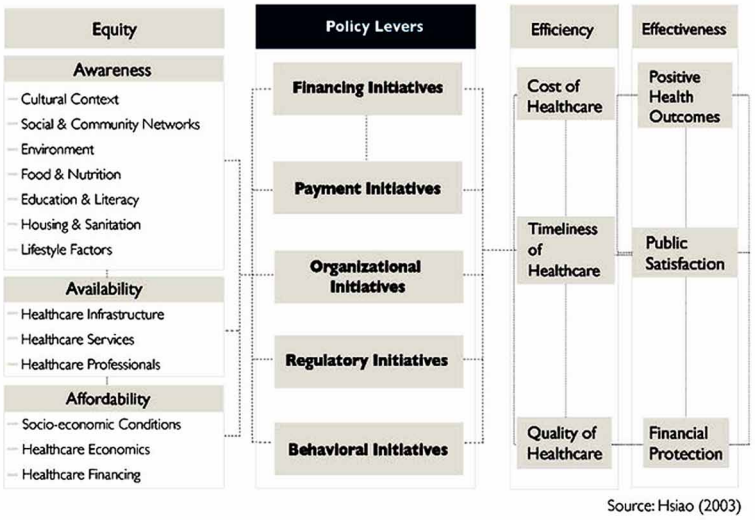
The healthcare system and its specific institutional architecture are the results of policy decisions and policy devices like financing, payment, organizational, regulatory, and behavioural initiatives are conditioned by the country's economic, social, and cultural context. Though government has attempted to define standards for healthcare facilities through legislation such as the Clinical Establishment Act, 2010, National Accreditation Board for Hospitals and Healthcare Providers (NABH), 2006, and Indian Public Health Standards (IPHS), 2007 (revised 2012), the rapid growth of healthcare is supported by

few entry barriers, poorly enforced regulations and lack of single authority to ensure that people have access to appropriate and cost-effective care. The Central government addresses issues related to health policies, regulatory matters, and disease control measures whereas State governments deals with healthcare delivery, financing, and training of personnel. As health is a State responsibility, these issues are left for them to manage. Given the weak starting position and complex realities of healthcare in India, researchers at the World Bank and the WHO have developed a 'Control Knobs' framework that analyses the policy devices like how healthcare is financed, provided, regulated, and what are the outcomes of different government plans which directly impact the transitional outcomes of cost, access, and quality of healthcare.

The *National Rural Health Mission* (NRHM), 2005 was accelerative step towards integration and convergence of health services, besides affecting architectural correction in the healthcare delivery system in rural India. Its vision envisaged provision of effective healthcare to rural population throughout the country, to begin with special focus on 18 states in 2005, which had weak public health indicators and weak infrastructure. The mission seeks to provide accessible, affordable, and quality healthcare to vulnerable and underserved rural populations across the country by adopting synergistic approach by relating health to determinants of good health viz. nutrition, sanitation, hygiene, and safe drinking water. This will have cascading effect on ultimate outcomes like improved health status, protection from the financial risks of illness, and consumer satisfaction (Hsiao, 2003).

Devising such a framework of policy levers of the health system, there are structural parameters that directly or indirectly affect health and healthcare (as shown in Figure 1) and it is also supportive in our understanding of the broader societal and regulatory constraints within which our healthcare system operates. The much anticipated increase in fund allocation for making healthcare reform a national priority has taken a backseat in budget 2015. The massive mismatch between the declared objective of UHC through the public health system and the actual level of expenditure thus remains a serious concern (Kacchap, 2015). According to Harvard scholars (Pritchett & Natarajan, 2015), "The unfortunate fiscal fact is that India may not be able to have anything like UHC where all people can have all medically effective treatments for all diseases".

Figure 1. Policy levers, intermediate outcomes, and ultimate ends of health system



HEALTHCARE CHALLENGES

Today public health is enabling a paradigm shift to healthy living, with emphasis on disease prevention. Bain analysis defined India's healthcare aspirations as "A healthy India, where citizens are health aware and engaged, and have equitable access to affordable health coverage with a focus on prevention, early diagnosis, and assured minimum quality of care, offered by a vibrant and sustainable ecosystem of public and private players" (as cited by Singh & Ghosh, 2015). A High-Level Expert Group constituted by Planning Commission of India in 2011, defined UHC for purpose of report as

Ensuring equitable access for all citizens, resident in any part of the country, regardless of income level, social status, gender, caste or religion, to affordable, accountable, appropriate health services of assured quality (promotive, preventive, curative and rehabilitative) as well as public health services addressing the wider determinants of health delivered to individuals and populations, with the government being the guarantor and enabler, although not necessarily the only provider, of health and related services.

State should not only provide health and related services, but should also address the wider determinants of health to effectively guarantee health security. It must make clear choices regarding the role of government for addressing these challenges, achieving health equity, including how the government will prioritize and fund Universal Healthcare by 2022. The focus of innovations will shift from the product arena to healthcare delivery and a demand will surge in an environment that favors delivering care using the power of information technology. A good system of regulation is fundamental to successful public health outcomes with constant focus on development of healthcare infrastructure and facilities. However, dis-aggregated data reveals that health status, distribution of healthcare resources, and health outcomes differs significantly across different states as well as urban-rural settings due to population pressure, faulty health policy, inequity, and too many governments run national health programs.

When it comes to healthcare, there are two Indias: The situation in urban India is close to developed country averages where private hospitals provide high-quality medical care to rich and middle class (access to healthcare services at a rate that is double of the rural poor and 50 percent more than national average), urban poor and rural population has access to public health system having inadequate hospital beds, lack of diagnostic equipment's, doctors, paramedics etc. Heterogeneity in the form of culture diversity, education, income, language, religion, social status, system of castes and tribes, high incidence of gender disparity, quacks and faith healers, alternative remedies among others also limit the access of rural population to urban private healthcare services for advanced treatments. Social and economic inequality is detrimental to the health of any society, especially when the society is diverse, multicultural, overpopulated, and undergoing rapid but unequal economic growth (Deogaonkar, 2004).

Access Difficulty

There are three main access difficulties described in the following.

Geographic Distance

It becomes critical with poor rural infrastructure, limited means of transport, people's access, and equipping supplies at remote healthcare facilities. Direct effect of distance on a given population from primary healthcare center on the childhood mortality is well documented in India (Bimal, 1991), Effects of difficult access to health centers are more pronounced for mothers with less education (Caldwell,

1979) and the distance from private hospitals does not affect the health parameters but the distance from public health center does. Difficulties in accessing healthcare facilities is an important factor, along with gender discrimination, as it contributes to higher maternal mortality in women who live in remote areas especially the tribal women in India (Basu & Jindal, 1990). Maternal mortality is clearly much higher in rural areas (United Nations, 2001) due to shortage of trained medical or paramedical staff who can handle complicated cases, as incentives to move to rural locations are generally insufficient and ineffective.

Socio-Economic Distance

Even though majority of healthcare facilities are overwhelmingly concentrated in urban areas, the '*socio-economic distances*' prevent access to economically weak urban poor living in slums and exposed to infectious diseases like HIV/AIDS, tuberculosis, hepatitis, dengue fever, pneumonia, cholera, malaria that easily spread in highly concentrated populations where water and sanitation services are almost non-existent (WHO,1996d). National Urban Health Mission (NUHM), 2005 with allocation of USD 3.78 billion was set up to address the healthcare needs of 46 million slum dwellers spread across 640 towns whereas NRHM, has also sanctioned more than USD 10 billion for capacity enhancement and upgradation of healthcare facilities. Socio-economic barriers also include cost of healthcare, lack of culturally appropriate services, language, ethnic barriers, and prejudices on the part of service providers. All these factors lead to an inability to identify symptoms and seek appropriate care on the part of the poor (WHO, 2001e).

Gender Distance

It is said that the health of society is reflected by health of its female population which is completely disregarded in India. Women in India are socially, culturally, and economically dependent on men (Narayan, Patel, Schafft, Rademacher, & Koch-Schulte, 2000). Whatever the socio-economic status of the family might be, woman in India is less likely to seek appropriate and early care for disease. It's hard to miss the fact that poor women are disproportionately affected by India's public health crisis. Gender discrimination in healthcare access becomes more obvious when women are illiterate, unemployed, widowed or dependent on others (Prakash, 1997). Poor women eat less; have weaker phenotype; they marry young; they give birth quickly, and often find it harder to access medical care making them more vulnerable to various diseases, associated morbidity, and mortality. Statistics shows that one in three Indian women did not receive an antenatal check-up during their pregnancy, 45 percent delivered their babies without the support of trained personnel, 58 percent of children did not complete their immunization schedule, 14.4 percent did not receive a single vaccine, and only one in two women seeks treatment for illness. Thus combination of perceived ill health and lack of support mechanisms (access difficulty and affordability) contributes to a poor quality of life for woman in India.

Infrastructure Shortcomings

India faces severe shortfall of both hard infrastructure and skilled talent both at rural and urban areas. Despite the existence of primary, secondary, tertiary health centers, and public hospitals, the healthcare system is seriously broken due to poor quality of facilities, lack of an organized delivery system, inadequate supplies, ineffective managerial skills, poor planning, monitoring, and evaluation of services.

Although rural India accounts for about 70 percent of the population, it has less than one third of the nation's hospitals, doctors, and beds, resulting in huge disparities in health outcomes across states. According to report published by IPHS, 2014, there is short fall of Sub-center's (SCs), Primary health center's (PHCs), Community health center's (CHCs) by 20, 23, and 32 percent respectively in India. It needs to add 1.7 million beds, double its medical manpower and increase its paramedical manpower three-fold to match WHO standards. With such gap, it becomes imperative to create an environment conducive to facilitate infrastructure creation and increase investments across the healthcare ecosystem (Bali, 2015). The foremost priority is to rebuild the public healthcare system using alternative financing and appropriate taxation, as it is single-handedly responsible for basic minimum care, national health programs etc.

Out of Pocket Financing

Health financing is one of the building blocks of health systems and proper allocation of funds is crucial for strong infrastructure and delivery systems. However lack of risk pooling and insurance could be argued as the main reasons for health-related impoverishment in developing nations (WHO, 2000f). National health accounts cell study in 2009 (as cited by Bhojani, et.al., 2012) said that 71.1 percent of healthcare is financed through out-of-pocket (OOP) payments by households in India and such payments act as the primary barrier to access healthcare services in India. (Berman, Ahuja & Bhandari, 2010) reported that approximately 6.2 percent of Indians fell below the poverty line due to OOP payments for healthcare; a greater proportion of them for outpatient care (4.9 percent) than for inpatient care (1.3 percent), and expenditure for medications constituted the greatest share (71.2 percent). High OOP payment for chronic conditions, even for outpatient care, accentuates socioeconomic inequalities. Healthcare costs worsen poverty, pushing an additional average of 39 million people into poverty every year (Balarajan, Selvaraj, & Subramanian, 2011). Strong public healthcare system would be crucial for the establishment of UHC and control OOP spending.

Fragmented Healthcare Industry

A vibrant and dynamic healthcare sector is imperative for the new human resource intensive world and quality healthcare is vital for the growth of any nation. India has largest private healthcare delivery systems in the world which nearly accounts for more than 80 percent of total healthcare spending of USD 38 billion in 2012. Such preponderance of the unorganized private sector in healthcare is not because of a preferred choice, but more because of functional imperatives like absence of affordable, convenient, and quality public healthcare delivery systems. Thus private sectors success is attributed less to its own efficiency and more to government's failure (Chirmulay, & Gupte, 1997). Although there is a big divide between the demand and supply of healthcare services across rural and urban India, off late the overall healthcare infrastructure in India is fast improving with initiatives like Public Private Partnership (PPP) and funding from international donor agencies. Healthcare system is broadly classified by using three dimensions which creates a complex plurality making development of an organized system difficult. These dimensions are:

1. Ownership styles:
    a. Public sector includes government-run hospitals, dispensaries, clinics, PHCs, SCs etc.

   b. Non Profit Sector includes voluntary health programs, charitable institutions, trusts, and missionaries.
   c. Organized private sector (for profit) includes qualified registered general practitioners, private hospitals, nursing homes, and dispensaries.
   d. Private informal sector includes practitioners not having any formal qualifications (e.g., faith healers, herbalists, priests, tantriks, hakims, and vaidyas).
2. Types of delivery structures (hospitals, dispensaries, and clinics).
3. Systems of medicine (Allopathic, Ayurveda, Homeopathic, Unani, and Siddha):
   a. **Allopathy:** The system of medical practice which treats disease by the use of remedies which produce effects different from those produced by the disease under treatment.
   b. **Ayurveda:** It aims to keep structural and functional entities in a functional state of equilibrium, which signifies good health. Any imbalance due to internal and external factor causes disease and restoring equilibrium through various techniques, procedures, regimes, diet and medicine constitute treatment.
   c. **Homeopathy:** It believes in a specialized method of treatment of curing diseases by administration of potency drugs, which have been experimentally proved to possess the power of producing similar artificial systems on human beings.
   d. **Siddha:** It emphasize that medical treatment is oriented not merely to disease, but also has to take into account the patient, environment, age, habits, physical condition.
   e. **Unani:** It is based on established knowledge and practices relating to promotion of positive health and prevention of diseases. It emphasise the use of naturally occurring, most herbal medicines, though it uses ingredients of animal and marine origin.

Bio-Medical Waste

Hospitals are complex institutions normally inhabited with patients, staff, and frequented by people without any distinction between age, sex, race, and religion. The main drivers of growth in the healthcare sector are India's growing economy; booming population; increasing literacy; awareness of personal health; increasing purchasing power; low treatment cost; technology adaption; and government supportive programs (social and food security), expansion of healthcare infrastructure, high patient turnout, growing burden of diseases and re-emerging infections due to infectious, chronic degenerative, and lifestyle diseases; have resulted in excessive use of medicines and disposables leading to unprecedented growth of bio-medical and hospital waste. According to Ministry of Environment and Forests (MoEF) gross generation of bio-medical wastes in India is 4,05,702 kg/day of which only 2,91983 kg/day is disposed, which means that almost 28 percent of the bio-medical and hospital waste is left untreated. Ostensibly, such infectious and often toxic waste, is littered around hospitals and it end up in our drainage system, which in turn has the potential to become ideal breeding grounds for vectors and spread infection.Improper acts of waste disposal pose a huge risk to the healthcare personnel who handle these wastes at the point of generation, health of the public, patients, professionals, and to persons involved in segregation, storage, transport, treatment, and disposal of such wastes (Joseph & Krishnan, 2004).

MAJOR HEALTH POLICY INITIATIVES

India's political leadership had made substantial contributions for advancing good health for people through National Health Policy (NHP) that covers pertinent dimensions of healthcare financing, healthcare delivery system, roles of public and private sectors, equity and affordability across rich and poor, phenomenon of convergence, divergence, and two-way causation between human development and income and the impact of increased longevity on social security. In India until 1982-1983 there was no formal health policy statement. The policy was part and parcel of the planning process and various committees appointed from time to time, which provided most of the inputs for the formulation of health programme designs. It was not until 1983 that India adopted a formal or official NHP with the goal of achieving "Health for All" by 2000 through stressing the creation of a strong primary health infrastructure, increasing the involvement of volunteer organizations and NGOs, and providing quality health-related serviceswhich are relevant to the actual needs and priorities of the community at a cost which people can afford (MoHFW, 1983c). Reappraisal and reformulation of the NHP in 2002 became necessary with changing context of healthcare, since it's over stated goals 'Universal, Comprehensive, PHCs'was not achieved.

Policy revision ensured that a reliable and relevant policy framework was available not only for improving healthcare but also measuring and monitoring the healthcare delivery systems and health status of the population in the next two decades. The main objective of NHP 2002 is to achieve an acceptable standard of good health amongst the general population of the country. It also needs to be praised for its concern for regulating the private health sector through statutory licensing and monitoring of minimum standards by creating a regulatory mechanism. Subsequently the primary aim of the NHP, 2015, is to "inform, clarify, strengthen, and prioritize the role of the government in shaping health systems in all its dimensions, investment in health, organization and financing of healthcare services, prevention of diseases, promotion of good health through cross sectorial action, access to technologies, developing human resources, encouraging medical pluralism, building the knowledge base required for better health, financial protection strategies, and regulation and legislation for health" (MoHFW, 2014d).

However new policy lacks vision to address issues of the larger majority and succumbs to pressure that push forward the pre-existing policies of dependence on markets, big business, and the corporate sector. In addition to above mentioned NHP, numerous policies having health related component were framed as prescriptions for achieving stated health outcomes through National Health Mission and to improve the health of India's population. These policies are: National AIDS Prevention & Control Policy, 1992, National Nutrition Policy, 1993, National Policy on Older Persons, 1999, National Population Policy, 2000, National Policy for Empowerment of Women, 2001, National Blood Policy, 2002, National Health Policy, 2002, National Policy on Indian System of Medicine & Homeopathy, 2002, National Environment Policy, 2006, National Pharmaceutical Policy, 2012, National Water Policy, 2012, National Policy for Children 2013, National Youth Policy, 2014.

India has built up a vast health infrastructure and initiated several NHP (aimed at increasing the standard of health of the people and decreasing the incidence of disease and death due to illness) over last five decades in government, voluntary, and private sectors under the guidance and direction of various committees (Bhore (1946), Mudaliar (1962), Kartar Singh (1973), Srivastava (1975), the Constitution, the Planning Commission, the Central Council of Health and Family Welfare, and Consultative Committees attached to the MoHFW. However most NHP functioned almost independently of each other and allocations for disease control programs was driven more by donor organizations will than by the

country's epidemiological realities. The government has increased the plan allocation for public health spending to USD 5.96 billion in 2011–12 from USD 4.97 billion in 2010–2011. Extra funding of USD 293.35 million is allocated to develop institutions like AIIMS. However, neglect of the public health sector is an issue larger than government policy formulation and with 20 percent cut in healthcare budget 2014-15 is putting at risk key disease control initiatives in a country whose public spending on health is already among the lowest in the world.

Government have prioritized healthcare sector in the 12th plan from 2012-17 and has initiated several steps like reduction in import duties, higher depreciation on life-saving medical equipment, tax exemption of 5 years on hospitals located in Tier II, Tier III cities, and rural areas, and 100 percent Foreign Direct Investment (FDI) under automatic route for healthcare services. Adoption of Public Private Partnership (PPP) model has resulted in growth of private healthcare facilities and private sector has emerged as a new avenue of reforms. There is a growing realisation that, given their respective strengths and weaknesses, neither the public sector nor the private sector alone can operate in the best interest of the healthcare system, rather public and private healthcare sectors can potentially gain from one another (ADBI, 2000; Bloom, Craig, & Mitchell, 2000; Agha, Karim, Balal, & Sossler, 2003)

Tier-II and tier-III cities are seeing more growth as more villagers around tier-II cities are expected to visit these healthcare centres for access to quality health service. Through partnerships, government has created a state-funded healthcare insurance program to provide basic healthcare services to poor. National Sample Survey Organization (NSSO, 42 round 1986-1987 & 52 round 1995-1996) puts the number of people who could not seek medical care because of lack of money increased significantly between 1986 and 1995. About 3.5% of the population fall the below the poverty line and 5% households suffer catastrophic health expenditure due to unaffordable health cost (Sahrawat, & Rao, 2011). It is the people belonging to the lower income classes or poor who suffer the most. This re-emphasizes the role socio-economic inequality in healthcare delivery. Involvement of the private sector is, in part, linked to the wider belief that public sector bureaucracies are inefficient and unresponsive, and the market mechanisms will promote efficiency, ensure cost effective, and good quality services (WHO, 2001g).

This unregulated growth of private healthcare sector also adds to an ever increasing social dichotomy. The dominance of the private sector not only denies access to poorer sections of society, but also skews the balance towards urban-biased, tertiary level health services, with profitability overriding equality, and rationality of care often taking a back seat. In the absence of an effective regulatory authority over the private healthcare sector the quality of medical care is constantly deteriorating (Mudur, 2004). Powerful medical lobbies prevent government from formulating effective legislation or enforcing the existing ones. A recent World Bank report acknowledges the facts that, doctors over prescribe drugs, recommend unnecessary investigations, promote longer treatments, deliver poor quality of services that are overpriced. Commissions for recommending investigation, gifts and other expenses provide to doctors from pharmaceutical companies to prescribe expensive medicines makes a hole in the system which is difficult to fill. Thus, the solution for satisfying the health needs of the people, we need structural changes in the political economy that can facilitate implementation of progressive health policies and plans.

KEY RECOMMENDATIONS

Mentioned below are critical steps that can help bring a successful transformation of India's ailing health system.

1. **Inclusive Growth:** It is now on the political and economic agenda of most nations around the world. Public policy and public sector forms only one part of the equation to achieving inclusive growth, the other part of the equation is private sector component having inclusive business models, is considered to have stronger and more sustainable potential to achieve inclusive growth. For India to improve the quality and affordability of healthcare services in both the public and private sectors, the country will need to intervene in each sector appropriately by developing inter-sectorial linkages, especially in promotive and preventive services which can immensely benefit from accessibility, equity, and efficient allocation of healthcare resources.
2. **Compliance:** A healthcare establishment needs to comply with numerous laws and the current regulatory mechanism is extremely weak due to fragmented structure. For example, The Quality Council of India (NAHB) comes under Ministry of Commerce and Industry, IPHS and Clinical Establishment Act comes under MoHFW, Medical Insurance (IRDA) comes under Ministry of Finance, Bureau of Indian Standards (BIS) and Consumer Protection Act comes under Ministry of Consumer Affairs, Food, and Public Distribution besides governing bodies like Medical Council of India and Dental Council of India. It is time that central government develops a framework for an India-centric healthcare system and assigns *National Priority Status* to the healthcare sector.
3. **Healthcare Financing:** Given the huge skew in health expenditure in the country with private sector contributing 80 percent of the total expenditure, government should introduce a host of financing mechanisms to improve our health infrastructure and realise its economic aspirations. The 12th plan has envisaged 150 percent increase in spending (2.5-4 percent) of GDP by 2025 from present 1.26 percent and restore balance in the long run as we know that public healthcare facilities which are burdened beyond capacity, under-equipped, underfunded, and understaffed.
4. **Bridging the Gap:** With huge differences in health outcomes across states, government should drive policy consensus and bring in uniformity in health regulations among the central and various state governments. It needs to create enabling regulations to foster private enterprise in healthcare in delivery infrastructure, medical education, R&D and domestic manufacturing and encourage development of healthcare infrastructure into underserved areas; optimize existing infrastructure by restoring non-functional capacity; and relax norms for expansion within existing facilities with enhanced Central government support.
5. **Universal Healthcare Coverage:** The government should institutionalize UHC as a way to remove barriers to good health and expand access to quality, affordable care. In the UHC model, all citizens should be entitled to a comprehensive package of healthcare services, and have access to public health and accredited private facilities for attaining services such as diagnostics, medicine, vaccines or surgeries as an entitlement, without having to pay at the point of use (Planning Commission of India, 2011). Anticipated demand growth following implementation of UHC will require substantial measures to enhance supply-side infrastructure particularly in rural areas.
6. **Disease Transition:** Current healthcare programs focus disproportionately on specialist care rather than primary care, which is arguably more important in meeting the treatable everyday needs of the poor, as country is saddled with a high burden of preventable illnesses. According to the NCD country profiles of 2014 released by WHO, diseases like cancer, chronic respiratory problems and cardiovascular diseases are the biggest global killers accounting for 38 million deaths every year with a whopping 28 million in low and middle income countries, including India. As per WHO estimates, NCDs account for almost 60 percent of the total mortality reported annually in India. Enabling a paradigm shift to healthy living, by developing a vision and roadmap for NCDs, India

should roll out high-impact public-health interventions by ensuring multi-stakeholder engagement and apportion of greater share of public spending on prevention of such diseases.

7. **Research Initiative:** Government should focus on research capacity building and institutional strengthening by making research initiatives more interactive with policies and making health research more relevant to Indian health system. Stakeholders can also encourage innovation in care models, shifting from hospital-centred delivery and procedure-centred, to fee-for-service models to low-cost delivery and so on.
8. **Control Out of Pocket Expenditure:** According to MoHFW, each year nearly 63 million people face poverty due to "catastrophic" healthcare expenditure, which neutralizes any gains made due to rising income. Various government schemes aimed at reducing poverty as the cost of seeking treatment even at public hospitals had increased five-fold (simultaneously, the cost of treatment in private hospitals increased nearly seven-fold), though the purchasing power of the poorer classes had not changed in any substantial way. Government should establish systems to rationally determine the pricing of publicly funded health products and services.
9. **National Medical Device Authority (NMDA):** Although India has a growing domestic medical device manufacturing sector the country still imports more than half of its high technology healthcare equipment. The draft policy issued by the central Department of Pharmaceuticals proposes an autonomous NMDA tasked with promoting the local industry and ensuring adherence to safety standards designed for the country's USD 4 billion medical device industries. It is assumed that efficient regulatory system will not only help benefit healthcare sector but it will support the development of India's domestic industry through 'Make in India' program and transforming India into an export hub for medical products and equipment.
10. **Controlling Private Sector:** The predominance of the private sector in healthcare in India is largely a consequence of the Indian government's failure to keep pace with the growing healthcare needs of its population. Although the growth of private-sector healthcare has generally increased access to healthcare services, there are concerns about cost of treatment which is way too expensive. Urgent steps need to be taken to enact legislation and institutionalize minimum standards, standard management protocols, patient's rights, ceiling on fees, and licensing based on need of the private sector. Further there is an urgent need to eliminate widespread irrational medical practices including unnecessary medications and procedures both in public and private sector organizations.
11. **Quality of Personnel:** Investments in training and educating a skilled workforce by encouraging the adoption of minimum standards, enhancing the skills and capabilities of doctors, nurses, paramedics, and allied personnel through training, career progression, and continuing medical education (CME) for professionals. Expanding the supply of healthcare talent in critical roles, increasing post graduate medical seats, bringing them at par with undergraduate levels, and encouraging public and private investment for establishing more medical colleges and training institutes will go a long way in providing healthcare services to all. Besides this competitive pay, and attractive living conditions (especially in rural India) will ensure that public health facilities are staffed by qualified people.
12. **Rejuvenating Traditional System:** The important resource of traditional and alternative healing systems needs to be encouraged, reasonable regulations and standards need to be introduced, and it should be integrated with the modern medical system based on reasonable standards. This would entail rejuvenating and enhanced public system support to AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha, and Homeopathy).

CONCLUSION

Since independence, India has undergone a slow but sustained demographic, social, economic, agricultural, nutrition, and health transition, its massive public healthcare service does not provide enough incentives for improvement in efficiency and quality services. The existing health system in India is fraught with many inequities (between states, urban-rural areas, and rich-poor) segments of the population, attempted efforts towards building a provider and patient-friendly public healthcare system is lost under the burden of weak regulations. It is no secret that many government programmes suffer from lack of focussed outcomes, implementation failures, and quality deficiencies due to low public spending. However, this would require large scale changes in the way that healthcare in the country is organised. Keeping the interests of the general public paramount, powerful vested interests would have to be curbed, regulated and made accountable health system having efficient disease surveillance mechanism, focus on primary, preventive, and affordable programs in conjunction with improved access to the entire spectrum of health determinants (food, water, sanitation, education, housing, environmental, and working conditions). There has to be a mix of public and private initiatives in healthcare in secondary and tertiary segments of healthcare leading to a system where everyone enjoys their 'Right to Health'.

As discussed India does not have a strong health infrastructure and has several weaknesses in its health system. Delivering affordable healthcare to billion-plus presents enormous challenges and opportunities for the medical community, insurers, and other service providers. Healthcare gap can be overcome by creating incentives for local companies, roping in support from global players having enormous potential in terms of their technological prowess, improvise overall process efficiency, work to build infrastructure to reach underserved rural areas, create innovative financing mechanism to deliver healthcare to the underprivileged, putting in place effective public-private partnerships program. Developing people-based initiatives like community health worker programs using resources from the public health system, appropriate use of traditional healing systems, and low-cost models of healthcare delivery will reshape healthcare outcomes. India needs to embark on the path of urgent reforms for strengthening health systems and provide UHC in accordance with the WHO framework, which includes the following six discrete "building blocks": (i) service delivery; (ii) health workforce; (iii) information; (iv) medical products and technologies; (v) financing; and (vi) leadership and governance (WHO, 2007h).

With regards to quality, there is little regulation of providers, treatments, and medical products, considerable variation in the training and education of providers, little or poor enforcement of laws, and separate regulations at central and state level. All this translates into poor health outcomes among the larger section of Indian population. Ensuring accountability of service providers through medico-legal instruments, that are agreed upon and implemented along with standardized protocols, as well as continuously enhancing consumer awareness at all levels about their rights to quality healthcare, may improve the current status of healthcare system in India. It was a glorious past, but the future of a healthy India lies in mainstreaming the public health agenda in the framework of sustainable development (Lakshminarayanan, 2011). The costs are huge, but there are enormous payoffs in long-term investment in healthcare. Such investments can not only raise quality of life for all citizens but also make the healthcare industry in India a great force for economic growth.

To achieve the required spectrum of changes of course demands a much wider social process. A powerful people's movement on health issues is needed, to enable people to more actively claim their health rights and to push for changes in the health sector. The ultimate goal of great nation would be one where the rural and urban divide has reduced to a thin line, with adequate access to clean energy and

safe water, where the best of healthcare is available to all citizens, where the governance is responsive, transparent, and corruption free, where poverty and illiteracy have been eradicated and crimes against women and children are removed and so on. A reorganised, strengthened and accountable healthcare system in conjunction with improved access to the entire spectrum of health determinants - food, water, sanitation, education, housing, environmental and working conditions – could lead to an India where everyone enjoys their Right to Health, and we are able to achieve the dream of Health For All.

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KEY TERMS AND DEFINITIONS

Communicable/Infectious/Contagious Diseases: It spread from one person to another or from an animal to a person via airborne viruses or bacteria, through blood or other bodily fluids.

Demographic Dividend: A country with both increasing numbers of young people and declining fertility has the potential to reap a 'demographic dividend'. It boosts economic productivity, when there are growing numbers of working people relative to the number of dependents.

Epidemiological Transition: It characterized by a shift in patterns of disease and mortality from primarily infectious diseases to chronic diseases (NCDs).

Health: It is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."

Health Promotion: "A process for initiating, managing, and implementing change, a process of personal, organizational, and policy development."

Non Communicable Diseases (NCDs): Non-infectious, non-transmissible (chronic diseases) which last for long periods of time and progress slowly like cancer, diabetes, cardiovascular diseases, chronic respiratory diseases etc.

Universal Health Coverage (UHC): "Ensuring equitable access for all citizens, resident in any part of the country, regardless of income level, social status, gender, caste or religion, to affordable, accountable, appropriate health services of assured quality (promotive, preventive, curative and rehabilitative) as well as public health services addressing the wider determinants of health delivered to individuals and populations, with the government being the guarantor and enabler, although not necessarily the only provider, of health and related services."

Wellness: "A state of a healthy balance of the mind and body that results in overall well-being."

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Section 4
Medical Practice

Chapter 24
Could Patient Engagement Promote a Health System Free From Malpractice Litigation Risk?

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ABSTRACT

In recent decades, medical malpractice litigation experienced a large-scale expansion in the United States as well as in Europe, involving both medical and surgical specialties. Previous studies have investigated the reasons why patients decide to sue doctors for malpractice and highlighted that adverse outcome, negative communication with doctors and seeking compensation are among the major reasons for malpractice litigation. In this chapter, patient engagement is discussed as a possible method for reducing the risks of doctors being sued for medical malpractice. The results of a first qualitative study underline how an active role for patients and their engagement in the treatment definition and execution could be a way to limit the occurrence of malpractice litigations. However, a second study noted that in Italy, many patients are still struggling to become involved in the process of their care. The authors discuss the role of professional education in promoting patient engagement in Italy.

INTRODUCTION

The first document presenting a case of medical malpractice litigation dates back to the second half of the 14th century. In 1374, Chief Justice John Cavendish on the Court of King Bench in England ruled on a civil liberty action against a London surgeon for the treatment of the crushed and mangled hand

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of a woman (Spiegel & Kavaler, 1997). However, it is during the nineteenth century that the number of malpractice suits first substantially increased. In the United States, between 1835 and 1865, the first "malpractice crisis" is documented. At that time, most cases were associated with poorly repaired fractures or were obstetrics problems (Badri, 2014). Some authors attribute the increase in malpractice litigations to the hostility between the law and professional medical practices because medicine is a prospective profession, whereas law is a retrospective one. In this regard, Ficarra (1976) wrote: "When a physician does anything to any patient, he is experimenting or medically speculating. However, if the patient suffers adverse results and sues, then the court applies what is by definition a retrospective judgement of a particular course of treatment" (p. 23). This point of view, used to explain that first increase in malpractice suits, is still valid. However, despite the increased interest in medical malpractice during the second half of the 20th century, updated data on the proportion of physicians who faced malpractice claims are lacking, at least until the last decade of the 1900s. Jena, Seabury, Lakdawalla and Chandra (2011) state that in the United States, from 1991 to 2005, 7.4% of all physicians had a malpractice claim, with many differences between the various medical specialties. Indeed, the proportion of physicians facing a claim each year ranged from 19.1% in neurosurgery to 2.6% in psychiatry.

In the same period, even in Europe, medical malpractice litigation has rapidly expanded (Di Nunno, Vimercati, Viola, & Vimercati, 2005). In Italy, hospitals, doctors and health professionals in general are increasingly subject to patients' complaints and are at risk of facing legal proceedings. As a consequence, current legal actions against physicians number approximately 15,000 per year, and hospitals spend over €10 billion to compensate patients injured by therapeutic and diagnostic errors. (Traina, 2009). Some clinical areas are historically more at risk of legal challenges, as is the case for orthopaedics, obstetrics and gynaecology; however, in recent years, even less traditional areas – such as emergency, radiology, surgery, oncology, etc. – have been subjected to malpractice litigation (Traina, 2009; National Association of Insurance Companies [ANIA], 2014). As an example, for Italian radiologists the risk of incurring a malpractice lawsuit has progressively increased and is now estimated at 44 per 1000. For these professionals, this corresponds to one malpractice claim for every 231 years of activity (Magnavita et al., 2013). The data provided by ANIA (2014) demonstrate that disputes in the medical field in Italy have increased by over 255% from 1994 to 2011 and further increased by 15% in 2011 compared to 2010, while in 2012 they decreased by 5% compared to 2011. This reduction does not necessarily mean a real decrease of malpractice litigations; rather, it can be considered the consequence of a different way of coping with the problem by local health organizations. Indeed, these organizations try increasingly to directly manage the vast majority of claims without giving notice to the insurance system, given the growth of insurance premiums and, often, the refusal of an insurer to willing assume the risk (Norelli, De Luca, Focardi, Giardiello, & Pinchi, 2015; ANIA, 2014). For a more reliable assessment of the extent of medical malpractice suits in Italy, a system able to acquire accurate information on medical litigation and to classify it would be useful. However, to date, a complete and comprehensive database on medical malpractice litigation is not available.

Among the main reasons that cause the suing of health professionals are diagnostic and therapeutic errors committed in their professional activities. Medicine is certainly not free from errors (Kohn, Corrigan, & Donaldson, 2000). Despite the great efforts made during the last decades to avoid medical errors and their consequences for patients, the number of adverse events caused by medical practice has not been reduced nor have hospitals become safer. Previous studies have highlighted a mutual influence between physicians' errors, adverse events and malpractice litigation risk (Renkema, Broekhius, &

Ahaus, 2014). These authors noted that because medicine has become more complex, it is natural that adverse events have also increased.

Facing the increasing risk of litigation to physician behaviour, many physicians respond with more defensive medicine, a peculiar interpretation of medical practice. Defensive medicine includes performing unnecessary medical procedures and tests, deviating from the practice guidelines and avoiding high-risk patients. However, to adopt a defensive approach in medical practice is not the best way to limit medical error. On the contrary, previous studies have underlined the importance of error disclosure by physicians and others health workers, for both organization and patient safety (Kreckler, Catchpole, McCulloch, & Handa, 2009; Waring, 2005). However, error disclosure can be difficult when there is a fear of complaints, so adopting a defensive approach seems to be a simpler response, even if it favours an increase in medical litigation (Renkema et al., 2014).

However, what drives a patient to sue his/her doctor or another health worker? Studies have investigated from various points of view the reasons why patients sue doctors. Table 1 lists the main studies that explore these reasons and categorizes them on the basis of the identified motives. According to these studies, an important role is played by failures in communication among physicians, patients and their family. Other important factors are dissatisfaction about care caused by an adverse outcome, the desire to prevent similar problems for other patients in the future, and the desire for revenge and compensation. Finally, some cultural factors could also have an important role, such as different ways of considering the patient-doctor relationship between Western or Eastern cultures.

Recent studies (Barello & Graffigna, 2014) have shown that increased active patient engagement is associated with better health behaviour, improved health outcomes, and more efficient healthcare utilization. Today, healthcare policies are evolving with a progressive shift in medical practice towards patient-centred care, one aspect of which is the approach known as shared decision-making. Many professionals have assumed that promoting shared decision-making and involving patients in the process of decisions about their care would reduce medical litigation. However, Durand, Moulton, Cockle, Mann and Elwyn (2015), in their systematic review of the relevant literature about this issue, concluded that given the number and heterogeneity of the studies, there is insufficient evidence to confirm this statement. Regardless, they suggested continuing the practice and research in this direction because these approaches could be effective against medical litigation. Indeed, when patients and physicians are engaged in a collaborative

Table 1. Main reasons for patients suing doctors and other health workers

Topic	Study
Negative doctor-patient/family communication and communication failure	- Hickson et al. (1994) - Levinson, Roter, Mullooly, Dull and Frankel (1997) - Moore, Adle and Robertson (2000) - Roter (2006)
Dissatisfaction about care	- Beckman, Markakis, Suchman and Frankel (1994) - Hickson, Clayton, Githens and Sloan (1992) - Levinson et al. (1997)
Desire to protect others from similar problems and to prevent similar incidents in the future.	- Hickson et al. (1992) - Vincent, Young and Philips (1994)
Desire for compensation (monetary or moral).	Bismark, Dauer, Paterson and Studdert (2006)
Cultural factors (connected with national/race characteristics)	- Chiu (2010) - Fileni and Magnavita (1995)

medical decision process, the health professional informs patients of the known harms and benefits and seeks to know the patients' preferences; every decision is discussed and documented, and this process should protect against medical litigation. In contrast, if the patient is not engaged in the process of care, the health professional more frequently adopts a defensive medicine approach; he/she orders more tests and diagnostic procedures, neither discussing the harms and benefits nor sharing the decisions with the patients. Thus, if a patient experiences an adverse outcome, there is a high risk of medical litigation.

In this chapter, an increase in patient engagement will be proposed as a way to prevent medical litigation. The first qualitative study will explore the reasons that cause patients or their relatives to sue physicians. Based on the results of this study, the chapter will discuss whether the engagement of patients in the process of care and in the medical decision-making process could be protective against medical litigation in Italy. The second study will analyse whether patients in Italy can be considered ready and willing to be involved in the process of their care. Finally, the implications of both studies for the development of educational programmes for health professionals will be considered.

FIRST STUDY: FACTORS INFLUENCING PATIENTS' DECISIONS TO SUE PHYSICIANS

Aim

As discussed previously, malpractice litigation in Italy has been progressively increasing in the last decades. However, to our knowledge, there are no studies trying to identify the causes of this phenomenon, at least with reference to the situation in Italy. The first study aims to analyse what drives patients or their families to sue health professionals, with particular reference to the specific situation in Italy. In exploring the reasons why patients decide to sue healthcare professionals, attention will be specifically devoted to aspects connected with their professional activities, as well as the impact of medical malpractice lawsuits on patients' and physicians' lives.

Methods

Participants

Nine individuals were involved in this interview-based study: the head of the legal department of an important hospital in Northern Italy, a technical consultant, two lawyers specializing in medical malpractice cases, two physicians, two patients and a family member of a deceased patient.

The physicians, the patients and the family member were directly and personally implicated in cases of medical malpractice. The inclusion criteria for these participants were that the civil lawsuit or criminal proceedings should still be ongoing or should have recently concluded. The two lawyers, the technical consultant and the head of the legal department of hospital were involved because they have long-term experience with medical litigation and with the judicial process derived from it.

Table 2 illustrates some socio-demographic characteristics of the participants, along with the abbreviations that will be used to identify them later in the text.

Recruitment of the participants was quite difficult, and finding physicians willing to talk about their experiences of medical malpractice was particularly difficult, despite help from some medical

professional associations and from AMAMI, an association protecting doctors accused of malpractice. However, those who agreed to participate were generally collaborative and interested in the study. One patient and the family member were happy to be given the opportunity to talk about the illness and their malpractice experience. The other patient was a little worried because the legal suit was particularly delicate and she was afraid that participating in the research could damage the possibility of winning the case and obtaining fair compensation; in any case, despite her concern, she too was collaborative. Even the lawyers, the physicians, the technical consultant and the head of the legal department participated without any particular problems.

Before beginning the study, ethical approval was obtained from the University of Milano-Bicocca, and the appropriate permission and information forms were used. Each participant received an information sheet and a consent form.

Interview

The participants were individually interviewed through a semi-structured interview consisting of previously prepared open-ended questions. The questions were centred on their personal experiences and understanding of medical malpractice and of its impact on their lives. The interview began with very general questions about what happened (e.g.: "Tell me about the experience of your illness and malpractice…"). When trust had been obtained and a good relationship had been established, questions about more focussed issues were asked (e.g.: "Why did you decide to sue your physician?").

The participants were asked to talk as freely as possible about what happened to them and what they considered important to their experience. In this way, the participants were free to orient the contents of the interview, selecting the most relevant aspects of the experience that resulted in the choice to sue, even if the interviewer often requested further details to obtain rich, insightful accounts on the basis of the participants' initial responses. Thanks to the flexibility of semi-structured interviewing, the participants could change the direction of the interview and even introduce new matters that the research team might not have thought of in planning the interview schedule (Smith & Osborn, 2003).

The interviews lasted from 60 to 90 min. and took place in a proper setting, either in the clinic or at the participants' homes or offices, depending on their preference. All of the interviews were audio

Table 2. Socio-demographics of the participants of Study 1

Participants	Age	Gender	Education	Role in the Study and Profession	Abbreviation
Participant 1	52	Male	Master Degree	Lawyer	Law 1
Participant 2	32	Female	Master Degree	Patient (Nurse)	Pat 1
Participant 3	76	Male	Master Degree	Lawyer	Law 2
Participant 4	62	Male	Master Degree	Physician	Phy 1
Participant 5	53	Female	Middle school	Patient (Bartender)	Pat 2
Participant 6	70	Female	Master Degree	Physician	Phy 2
Participant 7	48	Male	Master Degree	Head of a legal hospital department	Hld
Participant 8	79	Male	Master Degree	Technical consultant	Tc
Participant 9	54	Female	High school graduation	Family member (Entrepreneur)	Fam

taped with consent and all of the recordings were transcribed verbatim, ensuring anonymity for each participant. A verbatim transcript of the semi-structured interview served as the raw data for the study. The participants were sent a copy of their interview transcript to verify its accuracy (Lincoln & Guba, 1985). This gave the participants the opportunity to either add things they forgot to say or change what they said. One participant was further interviewed to explicate some of his narrative. This procedure guaranteed the authenticity of the obtained data.

Analysis

The data were analysed using interpretative phenomenological analysis (IPA) (Smith, 1996; Marriott & Thompson, 2008). IPA is an idiographic qualitative methodology that involves the analysis of verbatim transcripts derived from in-depth, semi-structured interviews with participants (Smith, 1995). It is widely used in health psychology to understand the ways in which individuals construe, make a sense of, and talk about their illness or aspects of it (Smith, Flowers, & Osborn, 1997). The aim of IPA is to explore in detail the participants' point of view about the topic under investigation; in this case, the experience linked with malpractice litigation. For IPA, a detailed analysis of each case is important, and it isn't necessary to have a consistent number of participants; therefore, sample sizes are usually small (Dickson, Allan, & O'Carroll, 2008). The results, of course, represent only this particular group of individuals and cannot be considered to be representative of the experiences of all patients and of all physicians.

Each transcript was read by every author thoroughly and repeatedly so that he/she could become familiar with the story and also obtain new insights about the issue explored. Then, one researcher made a close interpretative analysis of each case: while reading, she recorded her initial notes in the text in one margin; then she re-read her notes, translating them into emergent themes at a higher level of abstraction; finally, she wrote these themes in the other margin of the text, using key words or phrases to capture the essence of the content. A second researcher reviewed and examined the themes identified by the first reader to ensure that they were well represented in the transcripts. Many themes emerged within each individual transcript; when the same themes appeared in at least half of the transcripts, they were categorised as being recurrent. The recurrent themes were then clustered into a consolidated list of super-ordinate themes.

Results

The analysis of the interviews with patients, physicians and lawyers demonstrated that medical litigation is the result of a process of care with many problems, particularly when it is considered from the patient's point of view. The respondents often spoke about the problematic relationship among patients and doctors during the process of care. They also underlined the difficulties in the relationship among physicians and the conflicts that originated from that situation. Sometimes it is very difficult for the patients to understand their disease and the real possibility of care and healing. Another aspect indicated by the respondents as a source of medical litigation concerned problems in the organization of the health facilities, which are often neglected and mismanaged by health workers but can lead to making errors. The physicians and lawyers also indicated that underlying the medical litigation was the desire for economic compensation by the patients or their relatives; this appears as a desire for partial compensation of the damage suffered by the patient.

Difficulties Concerning the Relationship between Patients and Doctors

There is consolidated evidence that the doctor-patient relationship plays a fundamental role in patient satisfaction (for a recent review, see Velasco, Miglioretti, Strada, & Vecchio, 2014). The (poor) quality of this relationship has also been identified as an important issue in most medical lawsuits. Indeed, in the cases considered in our study, it is possible to note that many malpractice suits are brought neither because of malpractice nor as a consequence of the poor quality of medical care but mainly as an expression of resentment about some aspect of the patient-doctor relationship and communication.

As the technical consultant says:

In many cases - I can't say what the exact percentage is, but in a large percentage - there's always been at least a disagreement between the family members and the doctor. (Tc)

And again:

Often doctors are arrogant. For example: a doctor couldn't get out from a critical care unit, and when he met relatives asking after their beloved's health, he made the sign that he flew to heaven. It happened! There are doctors who have behaved extremely rudely, even irritatingly. (Tc)

Even the two lawyers are of the same opinion:

Sometimes I observed that the inhumanity of the physician was behind a certain hatred towards him, and it had a part in determining the course of events, independent of the liability of the physician. (Law 1)

And:

Not infrequently, doctors are quite brusque with patients, and this is the worst mistake they can make. Quite frequently – I notice, from what I hear –there are patients or relatives who ask for information and aren't treated by doctors with due courtesy; doctors neither give adequate explanations of what they are doing nor what they should have done, and so on. And this is really important! So, the more the doctor tries to explain and to be present towards patients or family, that often are objectively boring, the better it is, since if things don't go well, the memories that these people have will be much more positive than if they were treated in a different way. The doctors are sometimes quite arrogant! (Law 2)

That's just what happened to one of the patients interviewed:

Meanwhile, he [the doctor] gave me a really exaggerated scolding in the hospital ward: he started banging, screaming and he took my wheelchair and threw it! He behaved this way in front of other patients, saying it was me that didn't want to walk and that my pains were not real. (Pat 1)

The feeling of not being considered as a person seems to also have a great influence on the decision to sue. This is what the family of the deceased patient says:

NO ONE at the hospital has ever deigned to make at least a phone call! This arrogance! This hauteur! They wanted to feel more powerful than medicine because probably if they had done what they had to do, such as medical checks, they would have noticed! And instead! Instead he passed on. (Fam)

...It was a place…a place where you aren't considered as a person, there isn't a smile, there isn't a word, there isn't a time when one feels comforted! (Fam)

However, above all, what seems to be the most unbearable for a patient is not to be heard:

He asked for help because he couldn't breathe, and after taking a deep breath, he said: 'I can't, I can't do it, please go to ask someone for an oxygen mask or something else because I can't breathe'; and so I went all around the ward to look for the doctor, and they always told me: wait lady, just a moment, this moment has to pass in a minute, he is just out of surgery! So I have to say that I did not feel cared for by physicians of the hospital. (Fam)

Doctors behaving in such a way also become an easy target of the anger that patient and their relatives already feel due to the disease and its consequences.

The doctor-patient relationship has also become more and more difficult in recent years because patients have raised their expectations. Indeed, in some cases, the cause of medical litigation is the refusal of the complications of the disease: patients not only want to heal, but they want to return to their previous lives. As one of the doctors interviewed highlights:

After the boom of the wellness, the patient claims to be healed, and he takes for granted that the doctor cured him of his problem. But now he asks not only to be recovered from his illness but also to be healed from alcohol, obesity, ugliness, and drugs, and these requests can cause increasing conflicts with doctors. The patient no longer hangs on to every word of the doctor… he continuously presents demands that are quite impossible to satisfy…Science, especially surgery, has made great strides, but we have not yet become taumaturgi." (Phy 1)

So there are a growing number of complaints and malpractice lawsuits involving physicians who are less prone to listening and discussing with patients. In this regard, the experience reported by the head of the hospital legal department who participated in our research is notable:

The relationship that the doctor has with the patient, based on: "I am the doctor, you are the patient, and you have to accept what I say," surely causes a damage claim, even only to punish the doctor and to be told that the patient was right. I have noticed that some doctors, especially for character profiles, establish such a relationship and then almost always take a claim. (Hld)

Given the problematic nature of the doctor-patient relationship in these circumstances, some doctors seem to experience a professional crisis in reference to their role. One of the doctors interviewed believes that:

Nowadays, the relationship with the patient has become too technical, we have lost that previous "golden charm"…that is, when I enter into a clinic to visit a patient I don't find there someone who hangs on

my every word…I find one who thinks, 'let's see what he is going to tell me,' maybe he has heard other opinions; it's almost a symmetric confrontation, that is, I have to explain to this patient why he must come to me or why he has to do what I say rather than what he thinks, or what my other colleagues have said, or what he read in the literature or on the internet! It is a job; it isn't a pleasure any more, like offering a gift; now, fundamentally I solve a problem, there is a problem and I'll solve it; before, to solve this same problem, it was enough to say: "Yes, ok, I'll do it, trust me." (Hld)

Trust is fundamental for a good doctor-patient relationship, in particular the trust of the patient towards his doctor:

It was a bad experience because I really trusted her…I trusted her and instead...and then, before I trusted another dentist, it took a bit of time…but this doctor put me at ease, he is so cute… (Pat 2)

All this involves inevitable negative experiences for the doctors who feel they have been betrayed:

She lost trust in us because she got worse and probably they thought that the surgery that I did was maybe too aggressive or that the full dentures should not have been made; what bothered me is that she asked to be re-operated on in another structure near our hospital by a doctor who did not know more than me, and so I felt betrayed. (Phy 1)

Another possible reason for suing, linked to the doctor-patient relationship, concerns transmission of information. If doctors do not speak clearly, there is a risk that lawsuits can be initiated to know exactly what happened. Physicians who are empathic towards their patients and can respond properly to their emotional needs and those of their families are less likely to be sued. According to one of the interviewed:

The physician must treat not only the patient, he must also assist relatives, since the doctor's presence is noticed by the relatives. When a patient is serious, relatives stay in the hospital from morning to night and even meet the doctors, maybe in the hallway, and saying a word is useful. I think this is the point to avoid...to reduce a lot the conflict. (Tc)

In addition to dealing with the patients in an honest and direct way, treating them as if they were a family member reduces risk. When things go wrong, if the physicians are honest and try to do everything possible to remedy the situation, the patient or his/her family will almost always give them the benefit of the doubt when they are in a critical situation. Listening, assuming responsibility, apologizing for situations where physicians or their team were responsible, and, finally, doing everything they can possibly do to resolve the situation manages the patient's (or family members') anger and reduces the risk of a malpractice lawsuit. Here is the experience of one of the interviewed physicians:

Once, we left gauze in a patient's belly, and we pulled it out. The patient laughed the matter off; he could sue us. This man was a patient who underwent surgery, and he had seven thousand gauzes inside him, and one of them remained there. It must not happen! But it can happen! This isn't a distraction, it is that a surgeon who was in the operating room for seven hours, to be careful here… to be careful there, the poor girl who is there and who has a row of gauze...it sometimes can happen. The surgeon was desperate, this was a very critical case, when I called his wife to tell her: 'Look, a terrible thing

happened,' his wife almost died, and when I said it was a piece of gauze, she started to laugh, 'Just for that?' He came here with a great spirit, he went through his minor surgery…we had a good relationship with them, they were here a while, we joked when the surgery went well. (Phy 2)

Difficulties Concerning the Relationships Between Physicians and Between Physicians and Other Health Workers

Another reason for medical litigation originates in difficulties in communication and in the relationship among colleagues, in particular among physicians and between physicians and nurses. These difficulties often cause a lack of trust among health professionals. In this case, doctors prefer to work alone but this can lead to an incomplete view of the patient's condition and can affect the quality of care. About this point, a doctor says:

I don't ever look at the medical records of nurses because these records are always written a little superficially: they see a parameter and write it, they don't think about the parameter. (Phy 2)

Sometimes, conflicts can also be caused by the desire to hoard as many patients as they can. Today, the physicians are increasingly in competition with each other to have many patients. In Italy, this is certainly caused by the diffusion of private healthcare, which has increased in the last two decades. About this phenomenon, a doctor says:

One of the causes of medical litigation are our colleagues, since to grab the customer, the colleague is ready to fire on his colleague's work; but he doesn't say anything directly, just a little phrase or just not to say something, and so they instil doubts, and the patient asks for information or consults a lawyer. (Phy 1)

When a lawsuit is pending, conflicts among physicians can adversely affect the physician involved in the process; if in the past, he had some conflicts with other colleagues, it is possible that his actions can be judged more negatively than they actually are.

For a long period, a doctor hardly dared to explicitly blame another colleague. Now, the situation in some way has reversed, in the sense that forensic medicine has often become a fierce opponent of the doctor. Unfortunately, in the medical world, there is also strong friction between schools and even between individuals: "I had to become the primary, he became the primary," and sometimes, especially in the provinces where there is a smaller community, I have been in situations where, when my client knew who was the consultant chosen by the judge, he said: 'Alas, I'm in trouble because this doctor is my enemy.' And so it was! In spite of everything. (Law 2)

Problems in the Organization of Health Facilities

Even the organizational aspects may play a role in increasing the amount of medical litigation. In the last decade, in Italy, to diminish the costs, many health facilities reduced their personnel while trying to maintain the same quality in the service provided. In some cases, technological progress and an increase in efficiency compensated for personnel reduction. In other cases, the personnel reduction enhanced the

risk of mistakes. Organizational chaos, tight schedules and work overload may drive the occurrence of mistakes both by the medical staff and by other health care professionals and may even be an obstacle for a good doctor-patient relationship.

Here are the views of one of the lawyers interviewed:

In the emergency ward anything can happen; one has to make quick, very quick decisions, in tremendous chaos, so these doctors are actually undergoing very considerable stress and therefore can make mistakes. (Law 2)

Difficulties of working under certain conditions are also recognized by one of the patients who participated in the research. She underlines that the nurses:

…experienced three shift changes in two and a half days (afternoon, morning, night). So I knew that the staff that I saw in the morning would have remained even through the night, and of course, this personnel won't be rested, since they are coming from a heavy round…and surely the shifts affected the availability of the nurses.

...The nurses were understaffed: if you called for a painkiller, no one came, nobody reached me. I called for ice because I had a big haematoma, and no one brought me ice, I remember, my relatives went to pick it up. (Pat 1)

Another problem underlined by patients is the lack of properly trained personnel in some health facilities, especially among nurses. The problem is attributed to the nationality of the nurses, and, in some cases, to their difficulties in speaking in Italian. This may adversely affect the relationship with the patient and also with other components of the care team. Regarding this aspect, a patient says:

The service was not good, the nurses gave you drugs without telling you the name, and so I said, 'What are these drops? You must tell me what you're giving to me!' 'No, just drink.' Then, the nurses were mostly foreigners. Nothing against a foreigner who has the right educational qualifications, but a Russian who comes to me and doesn't speak Italian, honestly how he can explain a drug? He can't because he can't speak to me. (Pat 1)

Sometimes patients can be frustrated by the lack of medical equipment. One of our interviewed patients declared:

They did not have the appropriate equipment to take you to the X-rays; the beds didn't pass through the doors, and so they had to constantly relocate from a bed to a stretcher, and moving immediately after surgery was already so painful, that is…already the surgery was painful, but some of my pain was probably also due to that issue. (Pat 1)

The Desire for Economic Compensation

According to some people who participated in this research, patients and their family can also sue physicians for economic reasons. One of the interviewed lawyers declared that:

Perhaps we are approaching the American model where people sue a doctor because a doctor is solvent, the doctor has insurance behind him.

... Now, medical negligence is also becoming one of the most desired areas by lawyers. Against a doctor, who is always insured but also against a medical hospital, the possibility for a patient to obtain compensation and for a lawyer to obtain a recompense are very high, and this is the reason why it is a particularly popular specialty. (Law 1)

For this reason, medical malpractice (real or perceived) has become a real business.

In other occasions, physicians themselves incite patients to sue their colleagues:

The person who urges people to make these damage claims or misleads the lawyer to make damage claims is a legal doctor who really misjudges the physician's work, both for lack of professional knowledge and for other reasons and to profit, to get money (to obtain the parcel). (Hld).

Finally, there are friends and acquaintances that advise the patient to sue:

Most requests are often induced by acquaintances, friends, and perhaps these people, after a certain time in years, suggest that the patient proceed with a damage claim because one could get compensation. (Hld)

However, only people who have not suffered real damage are motivated by speculative reasons:

Some people are driven more by speculative reasons, though this happens, in my opinion, mostly to those who haven't suffered a real wrong. Those who have been wronged don't start a lawsuit for that reason. (Law 1)

Discussion

The results we obtained from our interviews are in line with those previously highlighted in the literature of other countries (Hickson et al., 1994; Roter, 2006), in particular with regard to the role of the relationship among patients and health workers as the most relevant reason underlying the origin of medical litigation. Furthermore, to offer other explanations for malpractice complaints, our results also highlight the importance of trust among the different actors in the care team (e.g., physicians and nurses), along with some of the organizational characteristics of the health facilities. Finally, in some cases, the reasons for suing health workers are connected with the expectation of economic compensation of damage.

This study involves only a small group of participants, and so these results are not generalizable to other contexts. However, it is possible to draw some interesting conclusions that could be used as a basis for further studies aimed at exploring the reasons for suing in a wider population.

First, our results underline the importance of the diffusion of the patient-centred approach because certainly this medical approach favours better communication and a better relationship among patients and physicians. The patient-centred approach provides care consistent with the values, needs and desires of patients and is achieved when clinicians involve patients in healthcare discussions and decisions (Constand, MacDermid, Dal Bello-Hass, & Law, 2014). Little et al. (2001) underline three main characteristics of the patient-centred approach that, in the light of the results of the present study, are

also relevant for preventing medical litigation: effective communication, partnership and health promotion. Effective communication has been defined as the exploration of the patient's disease and illness to develop an understanding of the patient's health care experiences. Partnership between clinicians and patients occurs to find common ground upon which a healthcare plan can be developed mutually. Finally, health promotion means the development of a health care plan tailored to the history of the patient (Mead & Bower, 2000). These three aspects could combat the effects of bad communication with patients. Moreover, by putting the patients at the centre of the medical process, doctors could also favour the relationship among colleagues and orient the organization of services, another two aspects that may cause medical litigation if they are poorly managed. If physicians adopt the patient-centred approach, they also likely make their decisions regarding care with patients, adopting a shared decision-making approach. This appears important to avoid medical litigation, though the efficacy of shared decision-making in medicine is poorly supported by research. However, even if there isn't any evidence that the patient-centred approach directly reduces medical litigation, this study suggests that this is likely one way to limit defensive medicine and also the possibility of medical litigation (Durand el al., 2015). This approach is also in line with greater patient engagement in the process of care. Graffigna, Barello, Wiederhold, Bosio and Riva (2013) define patient engagement as "a multidimensional psychosocial process resulting from the conjoint cognitive, emotional, and behavioural enactment of individuals towards their disease condition and its management." However, this first study showed that the patients appear not to be engaged in the process of their care; in fact, they complain about not being informed and involved, and they emphasize that the physicians certainly do not adhere to the culture of patient engagement. Thus, patient engagement cannot be taken for granted. The scientific literature shows that the concept of patient participation is still poorly defined. In particular, many terms are used to indicate similar concepts, such as "patient engagement," "patient involvement," "patient collaboration," "patient empowerment," and "patient-centred care." Certainly, if more participation of patients than in the past could be very useful to improve medical practices and to avoid errors and medical litigation, this approach must still be adopted among physicians because they not always favour it.

However, probably this is true also among patients: we know very little about what the patients think about their engagement in the process of care. Considering that, traditionally, the patient was passive and waited for the physician's decision, we can expect that also for patients, there could be some resistance to assuming a more active role in their care due to psychological, educational or cultural reasons.

In the second study presented in this chapter the focus is specifically on this aspect: do patients want to be engaged in the process of care?

SECOND STUDY: PATIENT ENGAGEMENT IN CARE AND SAFETY PROCESSES IN A HOSPITAL SETTING

Background

Patient participation in care is a complex concept developed within the consumer movement since the 1960s. In this period, the idea that the consumer has the right to safety, to be informed, to choose and to be heard emerged (Longtin et al, 2010). In the last decades, patient participation has increasingly become a key component in the process of care, in particular with regard to the safety of care and the

process of decision-making and treatment of chronic disease. Indeed, the evidence that underlines the importance of patient participation or patient engagement is abundant.

Our previous study highlighted the role of patient participation to prevent medical litigation. Hall et al. (2010) present some evidence for the effectiveness of interventions designed to promote patient involvement to favour the safety of the medication. In another study, Arnetz et al. (2010) found a significant association between patient involvement and health and behavioural outcomes after acute myocardial infarction. O'Brien et al. (2013), departing from the previous evidence that involvement of patients in therapeutic decision-making is beneficial to patients, have identified facilitators and barriers to the involvement of women with breast cancer in therapeutic decisions.

The core of patient participation and patient engagement is the new definition of the role of patients, where the patient becomes a key player in every process of health care. This new active role for the patient is encouraged not only in the scientific literature but also in the governmental policies of many states (Longtin et al., 2010). However, do the patients want to assume this new role? Previous studies among the US population estimated that approximately half of the respondents prefer to delegate decisions about care to physicians (Levinson, Kao, Kuby, & Thisted, 2005). In another study in the UK, involving patients waiting for a visit by general practitioner, 86% of the participants expressed the desire to determine the course of treatment together with their physician (Little et al., 2001). To our knowledge, there are currently no other studies that explore this aspect in Italy.

Aim

This second study evaluates the level of involvement in the health care process and in safety management in a group of Italian inpatients. Moreover, the study aims to investigate the relationship among the patients' involvement and their social and personal characteristics, their beliefs about the importance of their involvement and their self-efficacy about their involvement.

Method

This study was conducted in two medium-sized hospitals in Northern Italy. An ad hoc questionnaire was developed to investigate patient involvement in the care process and in the management of their safety. The study was proposed to all hospitalized patients, after their informed consent, in the last days before discharge (1 or 2 days before).

Participants

Two hundred twenty-five patients participated in the study. Table 3 describes the principal characteristics of the patients. They were hospitalized for a large number of reasons, but for general classification purposes, 25.8% of the patients were hospitalized for diagnostic reasons, 29.8% for surgery and 44.4% for rehabilitation. More than half of the patients were hospitalized for more than seven days.

Questionnaire

The ad hoc questionnaire was developed from an earlier study by Davis, Koutantji and Vincent (2008). These authors analysed the patients' propensity to ask doctors and other health workers two types of

Table 3. Demographic characteristics of the participants in Study 2

Age:	59±15
Male:	53.3%
Education:	
– Primary school	37.1%
– Middle school	26.8%
– High school	29.0%
– Degree	7.1%
Profession:	
– Manager	3.6%
– White collar	16.4%
– Blue collar	11.6%
– Self-employer	8.9%
– Student	1.8%
– Retired	52.4%
– Unemployed	5.3%

questions: i) questions concerning actions regarding their care (factual questions) and ii) intrusive questions (challenging questions) regarding their safety and its management. According to the authors, the propensity of patients to ask these types of questions can be considered a signal of their active participation in the process of care and in the management of safety in the hospital.

The questionnaire was structured in four parts. The first part considered the social and personal characteristics of the participants. The second part (30 items) concerned the involvement of the patients in the process of care and in the management of safety; as an example, this part contained items like: "Have you ever asked doctors or other health workers: How long shall I stay in hospital?" (factual question) or "Have you ever asked doctors or other health workers: Have you washed your hands before this medical procedure?" (challenging question). The responses were given on a five-point Likert scale, ranging from 1= never to 5= very frequently. The third part (17 items) collected the beliefs of the participants about the importance of patient involvement; an example of an item in this category is as follows: "How necessary is it for you to have information about your health?" In this part, the responses were given on a five- point Likert scale, ranging from 1= none to 5= most. The last part (12 items) considered the patients' self-efficacy about their active role in the process of care and in their safety management. Examples of items are: "Are you able to ask information about your health to health workers?" or "Are you able to report the errors of doctors or other health workers?" The responses were given on a five-point Likert scale, ranging from 1= none to 5= most.

Analysis

The mean and standard deviation for each item in the scale was calculated to evaluate the involvement of patients in the process of care and in safety management, the beliefs of patients regarding the importance of their involvement and their self-efficacy in the process of involvement. ANOVA and t-test were used to evaluate whether sex, age and education could be determinants of the differences in the involvement of the patients. All analyses were performed using SPSS v.21.

Results

Table 4 presents the results for the items regarding the involvement of patients in the process of care and in safety management. Generally, the mean for each item was low and highlighted that the patients are not in the habit of asking the physicians about their health or the management of their safety. In particular, patients seem to be reluctant to ask questions that the physicians could evaluate as intrusive, like those regarding their role, the accuracy of the medical procedures performed and safety. However, patients with higher levels of education (degree) are more likely than patients with lower levels of educational (elementary school) to ask questions concerning their health and safety (in Table 4, an asterisk * signals the questions where there was a significant difference in frequency ($p < .05$) based on the level of the education of the respondents). Even the age of the respondents influenced the tendency to ask questions about the process of care and the management of safety. In particular, younger patients (<50 years) ask questions more frequently than others (in Table 4, significant differences ($p < .05$) are signalled by the symbol †).

The third and fourth parts of the questionnaire considered the beliefs of patients regarding the importance of having an active role in the management of disease and their safety and self-efficacy about their involvement in the care process and in safety management. To verify the mono-dimensionality of the scales concerning these issues, two Principal Component Analyses were performed on the data obtained. Both analyses resulted in one factor explaining a consistent proportion of variance: 38% for the beliefs scale and 34% for the self-efficacy scale; in both cases, the reliability of the scales was good, with a Cronbach alfa of 0.89 and 0.83, respectively.

Indices of belief about the importance of patient involvement and self-efficacy about involvement were calculated, based on the average of the items for each factor. Table 5 shows the mean value of each factor for the total sample and for segments identified by gender, age and level of education. While gender does not influence the patients' beliefs about the importance of involvement and their self-efficacy, age influences their beliefs, and the level of education seems to have a role in increasing both of the dimensions. Indeed, younger patients give more importance to patient involvement, and patients with a higher level of education give more importance to patient involvement and also show a higher self-efficacy in their role in the process of care and in the management of safety.

Discussion

This second study aimed to verify, in a sample of Italian patients, whether they were interested in being engaged in the process of their care. In particular, it considered the frequency with which the participants posed questions to their physicians about their health and safety management, as a proxy of their active participation in the process of care. The importance for the patients to be involved in their care and their self-efficacy in assuming an active role in their process of care were also investigated. In this study, an ad hoc questionnaire developed from an earlier study by Davis, Koutantji and Vincent (2008) was used. This is a limit of the study. However, the results show that the participants in the study were minimally involved in the process of care and safety management. Many of them assumed a passive role, giving to the clinician the total control of their care and treatment. As in previous studies, educational level and age seem to affect the level of the patients' engagement, with older and less educated patients assuming a more passive role then others (Haug & Lavin, 1981; Longtin et al., 2010). Participants recognized the importance of having an active role in the process of care, but many of them did not assume this role

Table 4. Patient involvement in the process of care and in safety management

Patient Involvement in the Process of Care. (Response Scale: 1-Never; 5-Very Frequent)								
	All	**Difference by Age**			**Difference by Scholarity**			
		<=50	**51-70**	**>70**	**Elementary School**	**Middle School**	**High School**	**Master Degree**
Have You Ever Asked Physicians:	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**
Can I have more information about my health status?	2.92; 1.2	2.77; 1.2	3.09; 1.2	2.77; 1.2	2.84; 1.2	3.03; 1.2	2.78; 1.2	3.50; 0.7
How long am I in hospital? †*	2.67; 1.4	3.46; 1.3	2.64; 1.4	1.98; 1.3	2.28; 1.4	2.83; 1.4	2.92; 1.5	3.06; 1.4
Shall I be fine after discharge from the hospital? †	2.57; 1.3	2.68; 1.4	2.78; 1.3	2.08; 1.3	2.51; 1.3	2.72; 1.3	2.42; 1.4	2.80; 1.4
Am I ready to go to home? †	2.55; 1.5	3.07; 1.5	2.65; 1.6	1.88; 1.3	2.27; 1.5	2.73; 1.6	2.60; 1.5	3.00; 1.6
Can I have more information about rules that I will have to respect after discharge? †	2.49; 1.3	2.70; 1.3	2.69; 1.4	1.93; 1.3	2.36; 1.4	2.65; 1.4	2.49; 1.3	2.63; 1.4
How long shall I be off from work? *	2.45; 1.4	2.74; 1.5	2.32; 1.4	1.89; 1.2	1.84; 1.1	2.66; 1.4	2.78; 1.5	2.36; 1.4
Which problems shall I have after my return home? †	2.26; 1.3	2.65; 1.3	2.38; 1.4	1.67; 1.2	2.05; 1.4	2.30; 1.4	2.38; 1.3	2.63; 1.3
Do I have to keep taking the medicines I was taking at home along with the treatment that you are giving to me now? †	2.23; 1.3	2.25; 1.1	2.53; 1.3	1.68; 1.2	2.06; 1.3	2.37; 1.3	2.18; 1.2	2.88; 1.1
Do I have to follow a diet? †	1.73; 1.0	1.82; 1.0	1.93; 1.1	1.30; 0.8	1.63; 1.0	1.75; 1.1	1.65; 0.9	2.25; 1.3
Do the drugs prescribed to me have side effects?	1.68; 1.0	1.60; 1.0	1.85; 1.1	1.43; 0.9	1.63; 1.0	1.75; 1.1	1.65; 1.1	1.75; 1.1
What are the possible alternatives of care? †*	1.62; 1.0	1.84; 1.0	1.74; 1.1	1.20; 0.6	1.39; 0.8	1.60; 1.0	1.86; 1.1	1.88; 1.1
Why should I sign the consent form?	1.51; 1.1	1.35; 0.9	1.63; 1.3	1.45; 0.9	1.55; 1.2	1.47; 1.1	1.34; 1.0	1.49; 1.0
What is the consent form?	1.48; 1.0	1.26; 0.7	1.56; 1.1	1.57; 1.0	1.53; 1.0	1.33; 0.9	1.46; 0.9	1.94; 0.3
Why do you use those instruments? †	1.40; 0.9	1.50; 1.0	1.54; 0.9	1.05; 0.3	1.24; 0.7	1.44; 0.9	1.43; 0.8	1.88; 1.3
Can you give me more exams before deciding on my treatment?	1.34; 0.8	1.37; 0.8	1.34; 0.7	1.32; 0.7	1.28; 0.6	1.42; 0.8	1.34; 0.7	1.44; 0.8
Would it not be safe to perform more evaluation before my discharge?	1.29; 0.7	1.32; 0.6	1.32; 0.8	1.22; 0.7	1.16; 0.6	1.50; 0.9	1.28; 0.6	1.31; 0.8
Which role do you have in this unit?	1.17; 0.6	1.26; 0.9	1.17; 0.6	1.10; 0.4	1.18; 0.6	1.23; 0.8	1.09; 0.4	1.25; 0.6
Could you re-check the procedure that you are performing because I do not feel it is correct? *	1.06; 0.3	1.07; 0.3	1.08; 0.3	1.02; 0.2	1.07; 0.3	1.05; 0.3	1.00; 0.0	1.25; 0.6

continued on following page

Table 4. Continued

Patient Involvement in His Safety Management. (Response Scale: 1-Never; 5-Very Frequent)								
Have You Ever Verified That:	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**
The hospital spaces are clean and healthy †*	2.82; 1.3	3.46; 0.9	3.00; 1.2	1.90;1.2	2.42; 1.4	3.00; 1.1	3.09; 1.2	3.25; 1.1
Meals are distributed according to the hygiene rules †*	2.69; 1.5	3.56; 1.2	2.91; 1.5	1.50; 1.1	2.24; 1.5	3.17; 1.5	2.79; 1.4	2.88; 1.7
Health workers are always tidy †*	2.58; 1.4	3.49; 1.1	2.71; 1.3	1.47; 0.9	2.05; 1.3	3.05; 1.4	2.72; 1.3	3.00; 1.5
Every medical procedure is performed in a way that is respectful of privacy †*	2.48; 1.3	3.14; 1.2	2.63; 1.3	1.57; 0.9	2.02; 1.3	2.90; 1.3	2.66; 1.3	2.56; 1.4
The medical procedure is performed in a way that is respectful of safety norms. †*	2.48; 1.3	3.11; 1.2	2.67; 1.3	1.57; 1.0	2.02; 1.2	2.85; 1.3	2.69; 1.3	2.75; 1.4
Health workers scrupulously respect the rules and procedures of hygiene and safety †*	2.40; 1.3	3.11; 1.0	2.55; 1.2	1.47; 1.0	1.98; 1.2	2.72; 1.2	2.58; 1.3	2.69; 1.2
Hospital equipment (beds, wheelchairs) are tailored to the needs of the patient †*	2.34;1.3	2.95; 1.2	2.57; 1.4	1.35; 0.8	1.94; 1.3	2.77; 1.3	2.48; 1.3	2.38; 1.3
In the hospital, there is an office for public relations in which is it possible to make complaints? †	1.52; 1.0	1.65; 1.0	1.68; 1.1	1.12; 0.4	1.37; 0.9	1.53; 1.0	1.69; 1.0	1.56; 1.1
Have You Ever Asked:	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**	**Mean; SD**
How many times have you performed this kind of procedure (medication)?	1.16; 0.5	1.14; 0.4	1.21; 0.6	1.07; 0.2	1.11; 0.4	1.25; 0.7	1.09; 0.3	1.25; 0.6
Have you checked that the instruments used are clean and sterile? *	1.06; 0.4	1.07; 0.4	1.09; 0.4	1.00; 0.0	1.07; 0.4	1.00; 0.0	1.05; 0.3	1.31; 0.9
Have you washed your hands before starting this procedure? *	1.04; 0.2	1.02; 0.1	1.05; 0.3	1.03; 0.3	1.06; 0.3	1.00; 0.0	1.00; 0.0	1.19; 0.5
Why are you not using gloves for this procedure?	1.01; 0.1	1.02; 0.1	1.01; 0.9	1.00; 0.0	1.00; 0.0	1.02; 0.2	1.02; 0.1	1.00; 0.0

Note: †= significant difference in patients with different ages ($p<.05$); *=significant difference in patients with different levels of education ($p<.05$).

because they felt unable to participate actively in their care. Indeed, the level of self-efficacy regarding the involvement of care was low in this study. Again, the educational level seems to affect both the level of importance given to patient involvement and the level of self-efficacy, with patients with lower education levels giving less importance to patient engagement and having a low level of self-efficacy. These results are consistent with studies that underline the importance of increasing patients' self-efficacy to improve their engagement. It is possible to do this by promoting reading, understanding and taking action on health information (health literacy), working together with clinicians to select appropriate treatment or management options (shared decision making) and providing feedback on health care processes and outcomes (quality improvement) (Coultier, 2012).

Certainly, from these results, it seems that there is still a long way to go in Italy to engage patients in the process of care.

Table 5. Belief of the importance of patient involvement and self-efficacy about patient involvement

	Belief of the Importance of Patient Involvement	Self-Efficacy About Patient Involvement
All participants	3.86±0.5	2.73±0.5
Sex		
Male	3.84±0.5	2.78±0.5
Female	3.88±0.4	2.68±0.5
Age		
<40	4.00±0.4*	2.81±0.5
41-50	4.02±0.5†	2.80±0.5
51-65	3.95±0.4	2.79±0.5
66-75	3.73±0.4	2.65±0.5
>75	3.64±0.5*†	2.62±0.5
Level of education		
Elementary school	3.73±0.4*	2.57±0.4*†
Middle school	3.91±0.5	2.77±0.5
High school	3.99±0.4*	2.83±0.6*
Master's Degree	3.88±0.5	3.10±0.7†

Note: * and † = significant difference intergroups for age or level of education, Bonferroni test, $p < 0.05$

CONCLUSION

In this chapter, we considered the causes of medical litigation in Italy, and we discussed the promotion of patients' engagement as a way to limit this phenomenon. In recent decades, medical malpractice litigation experienced a large-scale expansion in Europe and also in Italy. Previous studies have highlighted that an important role in determining medical litigation is played by failures in communication among physicians, patients and their family; by dissatisfaction with care; and by the desire for revenge and compensation. The first study of this chapter confirmed that a poor relationship between patients and clinicians is one of the most important causes of medical litigation, together with some organizational aspects, physicians' conflicts and the patients' desire for damage compensation. The patients and the physicians interviewed referred to the communication and relationships among physicians and also to patients assuming a role that is too passive. In the stories we collected, the patients passively accept the physician's decision about the therapeutic process; thus, if there is a problem, the physician remains the principal person responsible. The participants did not report co-participation of patients, and the physicians are the only director of the care, both in positive cases, when the care is successful, and in negative cases, when the care causes damage to the patient. The participants in the first study underline the fact that medicine today often describes itself as foolproof. Patients increasingly claim to have healed and desire to return to the life they led before the onset of the disease; they do not accept the complications or the disease itself. In these situations, the patients could rapidly change their opinions about the physicians, shifting from a state of complete trust to a state where the doctor-patient relationship is characterized by lack of trust, causing conflicts that can contribute to the increase in litigation. Moreover, in the case of a serious chronic illness, the patient may experience a strong sense of helplessness and abandonment.

He/she may feel lonely and depressed, and when anger takes over, the physician who accompanied the patient in his/her care can become an easy target for this deep state of uneasiness and resentment, particularly if the physician has not considered the patient in the process of care from the beginning of the disease. The risk decreases significantly when a patient feels that the treatment decisions were shared. In this case, the patient will be better able to accept the negative consequences, without being overwhelmed by anger or thinking poorly of the capability and professionalism of the doctor. The risk of malpractice litigation diminishes if the patient feels that he is co-participating with clinicians in the therapeutic choices. Thus, the promotion of patient involvement and patient engagement seems important to prevent medical litigation.

However, the second study showed that in Italy, many patients continue to have a passive style regarding their care. In particular, older patients and patients with a lower level of education did not discuss their care with their physicians, perhaps because they do not feel capable of doing so. These results highlight an aspect that is little discussed in the literature about patient engagement, specifically regarding the patients' participation. Often, the literature underlines the importance of physicians adopting a less traditional and less paternalistic approach, instead choosing an approach that favours the patient's participation such as the patient-centred approach. However, the results of our two studies show that even if an approach that favours patients' participation is important to avoid medical litigation, it is also necessary that patients change their approach to care. Today, to promote patient engagement means to initiate health education campaigns that help the population, in particular older people and those with a lower level of education, to understand and learn this different approach to their care. Physicians play an important role in this, but they cannot be alone. All health professionals should have a role. Even psychologists, as experts of health education and behavioural change, are important because they help in tailoring the interventions, taking into account the real lives of the patients. This aspect could be useful to help patients manage the different aspects of life in which they are invited to be engaged: work, family, health, etc. This is not simple for the patient, and in different moments of his life, he may refuse an active role in some aspect, including work, family or management of health. Future studies should focus on addressing this problem.

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KEY TERMS AND DEFINITIONS

Defensive Medicine: Medical practices designed to avoid the future possibility of malpractice suits. Clinicians may order tests, procedures, or visits, or avoid high-risk patients or procedures primarily to reduce their exposure to malpractice. Defensive medicine causes an unjustified increased of sanitary cost.

Interpretative Phenomenological Analysis (IPA): IPA is an idiographic qualitative methodology that involves the analysis of verbatim transcripts derived, for example, from semi-structured interviews. It is widely used in health psychology to understand the ways in which individuals construe, make a sense of, and talk about their illness or aspects of it. The aim of IPA is to explore in detail the participants' point of view about the topic under investigation.

Medical Error: The deviations from the process of care, which may cause harm to the patients. Reason (1990) talk about the failure of a planned action to be completed as intended (an error of execution) or about the use of a wrong plan to achieve an aim (an error of planning).

Medical Litigation: A lawsuit or legal action moved by a patient or by his/her relatives against medical practitioner in relation to a doubt of medical malpractice.

Medical Malpractice: Medical malpractice occurs when a medical practitioner acts in a negligent manner when treating a medical condition. In particular, the treatment provided is substandard and may cause harm, injury or death to a patient.

Patient Centred Medicine: "Patient-centered medicine" is a form of medical practice, in which the doctors seek to focus attention on the individual patient's needs and concerns, rather than only on the illness.

Patient Engagement: A way to propose the patients' participation into health care systems in which patients and providers work together to improve health.

Patient Involvement: In a lot of cases this term is used as a synonymous of patient engagement to indicate the patients' participation in the process of care and in the decisions about it.

Shared Decision Making: Shared decision making is a collaborative process in which patients and their providers make health care decisions together, taking into account the best scientific evidence available, as well as the patient's values and preferences.

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Chapter 25
A Simulation Framework for Evaluating the Effectiveness of Chronic Disease Management Interventions

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ABSTRACT

The treatment and management of chronic diseases currently comprise a major fraction of the United States' healthcare expenditures. These expenses are projected to increase as the US population ages. Utilization of the ambulatory healthcare system stemming from chronic conditions has been seen as contributory factor in the rising expenditures. Efforts to better manage chronic conditions ought to result in better health outcomes and, by extension, savings through lower utilization of ambulatory services. The longer-term financial consequences of such interventions, however, are more uncertain. This study offers a System Dynamics simulation framework that identifies and models the critical relationships associated with health outcomes and longer-term financial consequences. This framework is demonstrated through a comparison between groups with a similar generic chronic condition, but one group is subjected to a management intervention and the other group is not. The framework provides constructive insights into how the initial intervention cost estimates, the resulting savings, and the health status may change depending on uncertainties, feedback effects, and cost structures.

1. INTRODUCTION

Major portions of U.S. healthcare expenditures are attributable to the treatment and management of chronic conditions. Nearly 78 percent of healthcare dollars were spent for treatment of chronic conditions in 1998 with an estimated half the female population and 40 percent of the male population having at

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least one chronic condition (Anderson & Horvath, 2004; Tu & Cohen, 2009). The increase in Medicare spending between 1987 and 2002 has been attributed to the treatment of patients with multiple chronic conditions (Thorpe & Howard, 2006). Medicare patients, for example, with a single chronic condition will have, on average, far fewer contacts with physicians annually relative those with multiple conditions (Vogeli et al., 2007). The per capita Medicare expenditure for those with at least four chronic conditions is roughly $14,000 while the annual expenditure for those without a chronic condition is less than $300 (Wolff & Starfield, 2002). Nearly half of the U.S. healthcare expenditures in 1996 are accounted for by the five chronic conditions of mood disorders, diabetes, heart disease, asthma, and hypertension (Druss et al., 2001). Chronic diseases are a persistent and escalating problem; 28 percent of adults with chronic conditions report financial problems in dealing with healthcare costs, more than double those with non-chronic medical conditions (Tu & Cohen, 2009) and the percent of personal income dedicated to the management of chronic conditions is significantly greater for the uninsured relative the insured (Hwang, Weller, Ireys, & G., 1996; Tu, 2004). Since chronic disease is common among non-disabled persons 18-64 years of age, these conditions frustrate U.S. work and productivity outputs (Hoffman, Rice, & Sung, 1996; Kessler, Greenberg, Mickelson, Meneades, & Wang, 2001).

Chronic diseases affect lifestyle, mobility, and longevity and are associated with ailments that do not have a recognized, permanent cure. There are a number of criteria available to assist clinicians and researchers in classifying chronic versus non-chronic conditions. Beginning in the 1990s, researchers argued for a non-categorical understanding of chronic vs. non-chronic conditions. Stein & Silver (1999) argue for a more inclusive definition, one that considers the functional status of the individual along with the degree of utilization of health care services over an extended period. Battersby et al. (2003) developed a generic self-assessment scale for management of chronic conditions. O'Halloran et al. (2004) provides a broader framework for defining chronic conditions wherein duration, prognosis, pattern, and sequelae are considered relevant factors.

The management of these chronic ailments may be approached through the application of a variety of interventions ranging from a medical-clinical management of the condition to an informed self-management of the condition (Barlow et al., 2002; Zwar 2006; Wagner et al., 1996). In its broadest sense, self-management includes engendering a sense of self efficacy and confidence in one's ability to change behavior and control the environment to better manage the impact of the chronic condition on quality of life (Bodenheinmer, Lorig, Holman, & Grumbach, 2002; Newman, Steed, & Mulligan, 2004). Gorobets consider and identify major socio-economic and environmental roots of chronic diseases at the global scale (Gorobets, 2011). Other interventions may offer patient financial incentives to better manage conditions (Weingarten et al., 2002).

Evaluating the effectiveness of intervention alternatives upon the behavior of a targeted population for a given condition is a meaningful undertaking. Since resources available for implementing interventions are limited in most scenarios, the ability to better understand the various clinical outcomes stemming from the competing interventions allows for the most satisfactory solution relative to the available investment. Thus, it becomes imperative to perform a thorough analysis to determine which intervention, or set of interventions, produces satisfactory results in terms of population health and cost. Table 1 summarizes basic literature related to quantifying the health and financial benefits of interventions targeted to address chronic diseases.

Most papers found in the literature focus on analyzing the effects post-intervention of particular interventions on certain populations that suffer a specific set of chronic conditions. From Table 1 and the literature discussed before, the following conclusions are possible. The majority of application-

Table 1. Summary of chronic disease evaluation papers chronologically sequenced

Author	Topic
Badamgarav et al. (2003)	Analyze disease management programs impact on health care utilization, treatment costs, and hospitalization for specific chronic disease: depression.
Glasgow, Davis, and Funnell (2003)	Promote as chronic disease intervention 'self-management' as an integral part of primary care, an ongoing iterative process, and patient centered. It promotes using collaborative goal setting and decision making.
Yu et al. (2003)	Use regression to identify the marginal impact of certain chronic conditions on total, inpatient, outpatient, and pharmacy costs to specific hospital settings.
Fortin, Bravo, Hudon, Vanasse, and Lapointe (2005)	Propose a method to estimate chronic disease prevalence in family practice patients by counting the number of chronic medical conditions and using a measure that considers the severity of these conditions.
Tsai, Morton, Mangione, and Keeler (2005)	Conclude that interventions that contain one or more elements of the Chronic Care Model (CCM) improve clinical outcomes and processes of care, and to a lesser extent, quality of life, for patients with chronic conditions.
Gerry, Hugh, Helen, and Gill (2005)	Question whether interventions for some chronic disease are cost-effective. Examines the quality and quantity of existing evidence of cost-effectiveness.
Yu-Chu and McFeeters (2006)	Study the effects of health insurance, health care needs, and demographic and area characteristics on out-of-pocket health care spending for low and higher income insured populations. This shows an impact on utilization.
Kennedy, Rodgers, and Brower (2007)	Analyze the promotion self-care as intervention in managing long term conditions. It analyzes why some interventions fail to deliver.
Linden and Adams (2007)	Describes the elements of a rigorous meta-analytic process to evaluate Disease management interventions.
Douglas, Daly, Kelley, O'Toole, and Montenegro (2007)	Evaluate how adding a disease management intervention to the usual care system affects outcomes after discharge from the hospital (mortality, health-related quality of life, resource use) in chronically critically ill patients.
Mattke, Seid, and Ma (2007)	Assess the evidence for the effect of disease management on quality of care, disease control, and cost, focused on population-based programs. They find reliable evidence that disease management enhances general processes of care and disease control. However, they claim that no conclusive evidence was found for its effect on health outcomes.
Cunningham (2010)	Highlight that escalating health care costs affect all socioeconomic strata, not just the poor.
Jansàa et al. (2010)	Determine treatment adherence as intervention in patients with multiple chronic conditions (MCC).
Naessens et al. (2011)	Determine the longitudinal effect on healthcare costs of multiple chronic conditions among adults aged 18 to 64 years.
Chen and Rice (2011)	Investigate the association between the number of chronic conditions and self-reported health-related quality of life (HRQOL) outcomes.
Nuijten and Dubois (2011)	Question the appropriateness of the use of cost–effectiveness data in health care decision-making.
Van Baal, Wong, et al. (2011)	Propose a conceptual model of how to estimate costs of unrelated diseases in life-years gained in a standardized method.
Galbraith, Soumerai, Ross-Degnan, Rosenthal, and Lieu (2012)	Compare and contrast financials versus treatments from lower incomes families. Conclude lower incomes families at higher risk for delayed/forgone care, thus interventions are required.

oriented literature falls into two categories. The first group involves studies performed utilizing some statistical analysis technique as an evaluation tool for analyzing the impact of interventions on health status, financial burden, and healthcare utilization. Most of these papers focus on determining the ef-

fectiveness of proposed solutions to improve the condition of patients. In general, as pointed out before, results post-intervention exhibit mixed outcomes which are contingent upon the interaction between the chronic condition, the targeted intervention, the aimed population, and the tested intervention. The need for a better health care and chronic disease management is an idea shared by these studies, as interventions aimed at reducing the costs. Disease management appears to improve the monitoring and caring of patients with chronic conditions. Yet, the results are not always acceptable. Thus, further research is required to assess the cost-effectiveness of disease management and consideration should be given to more alternative programs. The second category involves proposing new methodological tools and models to perform these analyses. Many authors propose quantitative tools that try to capture complexities through the consideration of intrinsic aspects that are believed to make a difference in the assessment process. Independently of past and current developments, there is a consensus that frameworks capable of encompassing and processing complex qualitative and quantitative information simultaneously are required to perform these evaluations.

The measure of 'success' of an intervention in re-directing system behavior is necessarily artificially set by policymakers. Perhaps the slowing of a health outcome or expenditure trajectory may be defined as the relevant goal while, in another context, the policy environment considers success as either the leveling off or reversal of a trend. That is, there is not a referenced standard that defines what constitutes an appropriate cost-benefit ratio. However, the establishment of *de jure* standards may be evidenced in the nature of the discipline's peer reviewed research. In this context, the quality-adjusted life year (QALY), the disability-adjusted life year (DALY), and the Life Years gained (LY Gained) are three classic measures for quantifying disease burdens and health impacts based on quality and quantity of life lived. These metrics have been the object of contention for many authors that question the measures' validities in adequately capturing the qualitative aspects associated with quality of life. Nonetheless, through progressive refinement, it can be said that they are broadly accepted within the research community as reasonable standards. Because of its versatility and its simplicity, we employ QALY as our representative metric.

QALY is a measure of a medical interventions capability to extend human life both in terms of duration and quality. This measure was first introduced by Zeckhauser and Shepard (1976) and is widely used for assessing healthcare interventions (Johannesson, Pliskin, & Weinstein, 1994). A coherent discussion of QALY methodology is presented by Sassi (2006). A medical treatment that increases duration of life alone, with no improvement in the quality of human life, is of less consequence relative to an opposing intervention that may not produce an equivalent increase in duration, but does improve life quality in those extended years. Thus, the extended years are *adjusted* in terms of quality. The quality of human life considers the level of pain, mobility, and feelings of general wellbeing that patients experience post intervention. Thus, the worth of an intervention may be considered in the context of the number of years by which a human life can be extended as well as the quality of those extended life years. Independent of which metric is adopted, projections over time must be generated (Phillips, 2009). System Dynamics simulation (SD) allows researchers not only the ability to intuitively illustrate complex systems, but also to project the unfolding dynamics over extended periods of time.

Characterizations of the treatment and prevention of chronic conditions within the U.S. population have been built using System Dynamics (Homer & Hirsch, 2006). This approach is used in quantifying improvements in care delivery services stemming from the implementation of chronic illness management programs (Hirsch & Homer, 2004). System Dynamics models are also used in measuring specific disease process trajectories and testing how they may be altered in the presence of social and environ-

mental conditions. For example, models for the progression of cardiovascular diseases are considered by Luginbuhl, Forsyth, and Hirsch (1981), Hirsch and Wils (1984), Petersen (2000), and Oga and Uehara (2003), renal diseases by Davies and Flowers (1995) and Georgantza et al. (2000), and diabetes by Jones et al. (2006), Milstein et al.(2007), and Murphy et al. (2006). These models incorporate a variety of socio-economic and environmental factors that act upon the progression of the chronic condition and contrast the *pre-* and *post*-intervention impact of such factors on the disease trajectory. Diaz et al. (2011) develop a generic system dynamics model to estimate the cost of chronic disease management interventions.

This article presents a System Dynamics framework that models the central factors involved in assessing chronic disease management interventions that include both the cost and health status of the population. The framework provides useful insights into how the initial estimates of the medical outcomes and associated costs depends on uncertainties, feedbacks effects, and investment levels over time.

The contributions of this research are several. First, this research demonstrates that an evaluation of the health and cost impacts stemming from chronic disease management interventions can be performed by using a simulation framework, one that is capable of capturing complexities. A sizable number of factors and interdependencies are decisive for evaluating the effectiveness of chronic disease intervention and a System Dynamics approach provides the framework that is able to represent these intricacies. Thus, the research extends the relatively limited literature in the application of System Dynamics to model and evaluate of the merits of chronic disease management interventions.

Second, this research offers an alternative method that explicitly considers the demographic composition of the chronic disease population. Institutions that provide ambulatory healthcare seek to identify an optimal balance among the competing tradeoffs inherent in adopting an intervention targeting a particular patient population. For example, of interest is the exploration of the fragile balance between health outcome effectiveness and cost associated with an intervention that aims to redirect target populations to more appropriate healthcare venues. The framework developed in this research may be used to generate knowledge and offer healthcare managers more versatility in analyzing the pros and cons of interventions prior to adoption.

Last, a comprehensive analysis of the impact of different strategies for managing chronic disease is necessary to the planning and allocation of the healthcare resources. The results obtained in this research present the possibility of evaluating the costs and effectiveness of interventions and the impact these may have on the larger volume of prospective patients within the broader healthcare system. Applying this framework makes possible a more comprehensive vision of the health effects and financial consequences stemming from strategies in the managing of chronic diseases.

In the next Section, essential System Dynamics background information is presented. Section 3 presents a brief review of disease management interventions followed by Section 4 which introduces the research question and approach. Section 5 describes the essentialities of the framework while Section 6 specifies the model's parameters as well as some hypothetical results. The conclusion is found in Section 7.

2. INTRODUCTION TO SYSTEM DYNAMICS SIMULATION MODELING

System Dynamics is a simulation tool that employs the concept of feedback as a critical core component of its technology. Diaz et al. (Rafael Diaz, Behr, & Tulpule, 2012) summarizes the fundamentals of this tool as follows. Feedback is typically defined as a process in which a change in the magnitude of a system parameter affects the prospective magnitude of the same parameter in the future. Feedback effects result

from causal loop effects. Such feedback loops are common in many simple systems. Population growth is one such example. As the newborns age and are capable of reproducing, the population keeps growing to a higher rate. As the birth rate increases, the population stock increases at a faster rate. Thus, the present rate of birth affects the birth rate in the future. These feedback loops may be classified as either a positive feedback loop (self-reinforcing loop) or a negative feedback loop (also called a balancing loop). Self-reinforcing loops are mechanisms in which a change in a parameter leads to further change in the same direction of the parameter. This results in an exponential growth. A balancing feedback loop is the one in which a change in a parameter leads to opposing change (that balances) in the magnitude of the parameter, thus stabilizing the system. In System Dynamics, the behavior patterns produced by a complex system are the result of the interaction between such feedback structures.

The replication of the feedback structures that collectively makes up a given system is accomplished through the characterization of a 'dynamic hypothesis.' Based on the notion of the feedback effects, a 'dynamic hypothesis' represents the 'theory' behind a current or expected system behavior. This hypothesis is capable of endogenously describing the observed performance of the studied system. Establishing a dynamic hypothesis involves identifying the system's feedback structures as well as the way these structures relate with one another. The 'dynamic hypothesis' is developed by the modeler through investigation, observation, and experimentation with the system. This entails extensive analysis and deliberation with potential stakeholders. This forms the foundations for any System Dynamics model. 'Dynamic hypotheses' are typically characterized as causal loop diagrams. Causal loop diagrams involve a collection of feedback structures that are represented by using directed arcs between causative factors as well as effected factors. While reinforcing loops are portrayed using a positive sign near the arc arrow head, balancing loops are represented by a negative sign. Notice that these polarities are exclusively related to the cause-effect relationships. Figure 1 from section 5 presents the high-level causal loop diagram developed for this article.

Although causal loop diagrams are critical components for investigating and conceptualizing a system, one cannot easily envision how the system's behavior unfolds over time. Causal loop diagrams are not executable models as such. They are not able to mimic the system behavior and replicate the dynamics of the system. However, causal loop diagrams facilitate the development of the 'stock and flow models' which are executable representations capable of replicating system behavior over time. 'Stock and flow models' may be transformed into synthetic executable representations of real-world systems by using a simulation software or application. Thus, the system behavior over time may be obtained from executing the simulation of a 'stock and flow model'. To characterize a stock and flow model, the variables from the causal loop diagrams are transformed into stock, flow rates, constant, or auxiliary constructs. An important aspect of the stock and flow model is the ability to represent accumulations commonly denominated stocks.

A model's variable that has values that are independent of the dynamicity of the system is called a stock variable. Furthermore, stocks represent accumulation within the system. In the population growth example above, the variable that represents the population is a stock; changes in number of people accumulate in the population stock. Thus, one may measure the continuous change in the number of people over time; as population increases and declines in different periods, the number of people accumulates and depletes in a cyclical fashion. If the number of people in a population stock was continuously measured over time and graphically plotted, then as the population stock fills and nears capacity (when regional carry capacity is exhausted and resources are depleted), one may see a smooth curve. If one instantly stops the process of people movement through the system (birth and death rate), the number of individu-

als in the population stock would remain static as in a picture. This allows researchers to analyze a given issue as well as the ability to understand the complexity associated to real-world situations. Additional information may be found in Sterman (2000).

3. INTERVENTIONS

Conventional wisdom suggests that disease management interventions, whether in the form of medications or informed self-management, achieve savings by improving quality of health. Improved Conventional wisdom suggests that disease management interventions, whether in the form of medications or informed self-management, achieve savings by improving quality of health. Improved health, in turn, reduces potential future complications and, by extension, achieves reductions in use of the health system. This process yields a positive net effect on the over-all cost to the system. Nevertheless, the claim that chronic disease management interventions for all chronic conditions lead to improved health while achieving cost savings is, perhaps, overstated. Disease management interventions have proved to be useful quality improvement tools. However, some authors argue that they do not produce cost savings. An extensive review of cost benefit studies in the context of chronic disease management is found in Goetzel et al. (2005). Reported are positive savings for multiple chronic conditions such as congestive heart failure. However, interventions targeted at chronic conditions like asthma produced mixed results while those targeting depression are reported to produce negative results. Thus, the cost saving may be dependent upon the chronic condition that is targeted.

Notably absent, though, is the consideration of the long-term related and unrelated costs stemming from increased life expectancy due to better management of the chronic condition as well as its effects on life quality. The consideration of *future* costs has been generally limited to consideration of 'related' healthcare costs. While controversial, the consideration of unrelated cost in intervention effectiveness studies is gaining wider acceptance (Rafael Diaz et al., 2011; Van Baal, Feenstra, Polder, Hoogenveen, & Brouwer, 2011). Although not explicitly addressed in this paper, it is reasonable to assume that the same combination of cost efficiency and not longer-term cost savings may apply to interventions for other chronic diseases in varying proportions (e.g.,Homer and Hirsch (2006)).

Attractive to policy makers are investments in intervention programs that are shown to have positive health outcomes and are cost effective. Although such programs may be cost effective in the near-term, the programs also may not be cost saving in the long-term. While we do not advocate a reduction in efforts to implement effective health intervention programs, it is necessary to have an informed understanding of the long-term cost and quality health impacts of such decisions, especially for healthcare programs such as Medicare, a federal system of health insurance for people over 65 years and some younger people, wherein policy officials and the public are concerned about rising costs and longer-term financial sustainability. The purpose of this paper is to develop a basic framework that will support such discussions.

4. RESEARCH QUESTION AND APPROACH

Policy makers are faced with central decisions in relation to the prioritization of intervention efforts meant to minimize the impact of chronic diseases in the population. Those population segments that are expected to suffer more due to limitations in resources to manage the chronic condition are at increased

vulnerability to the effects of management interventions. As most chronic conditions progress, health status may deteriorate leading to an increase in mortality and morbidity.

Policy response to alleviate the impacts of chronic diseases may take the form of clinical, socio-economic, and/or educational interventions. Over the coming years, there necessarily will be a process of parsing resources among competing interventions, some receiving substantial attention and support while other strategies will receive little or no attention. There likely will also be discussion of policies designed to protect some population groups while leaving others at risk. The priorities set during these initial stages may have profound long-term health consequences and cost implications.

The central objective of this research is to develop a framework that allows researchers and policy makers to understand how our near-term policy decisions, with regard to the extent and placement of intervention strategies, will condition the dynamics of population health of selected population groups over time. Specific aims are to 1) identify and model critical variables that characterize the relationships among intervention strategies and their impact in terms of health effectiveness and cost, and 2) model the sensitivity of populations to the various intervention policy options.

This research proposes a modeling and simulation (M&S) framework based on SD to represent and simulate interactions between intervention strategies and public health. The four basic steps that gird our approach are as follows: 1) represent the general flow of patient populations with a given profile, 2) represent the main factors that affect the implementation of intervention strategies, 3) represent the driving forces that act upon public health in the context of chronic disease management and potential interventions to maximize the management of chronic condition, and 4) simulate the system and validate results. In the following sections, the authors describe the salient features of the framework.

5. THE PROPOSED FRAMEWORK

Simulation models are simplified synthetic representations of the real-world setting in which critical system components are explicitly represented while capable of mimicking system's behavior over time (Rafael Diaz & Behr, 2010). The selection of these critical components for this paper is based on three critical sources of information that include: 1) the existing literature on the subject, 2) subject matter expert information from our teaching hospital partner in the region, and 3) the empirical evidence collected from 3 major surveys performed by the authors in a major healthcare institution in the region.

The evaluation of the effectiveness of chronic disease management interventions is a complex problem that requires a framework capable of capturing and processing the complexities associated with representing the targeted population as well as the intricacies related to the implementation of a given set of interventions. In addition, this framework requires the ability to quantify the impact of these interventions on the targeted patient population as well as on the supporting healthcare system.

One perspective for solving this problem involves formulating the problem as a demand-supply model (Murray M, 2003). Using this angle, one may conceive the demand as targeted populations seeking healthcare services (Ansari, Laditka, & Laditka, 2006) while healthcare institutions provide these services in the form of interventions Voss (Voss et al., 2011). The impact of this demand for services on these organizations may be measured by the total utilization of the healthcare institutions (National Center for Health Statistics, 2010), and therefore, the costs associated with providing these services. Conversely, the impact of the institutions rendering these services through the implementation of interventions on the patient population may be measured by QALY (Abellán-Perpiñán, Pinto-Prades, Méndez-Martínez,

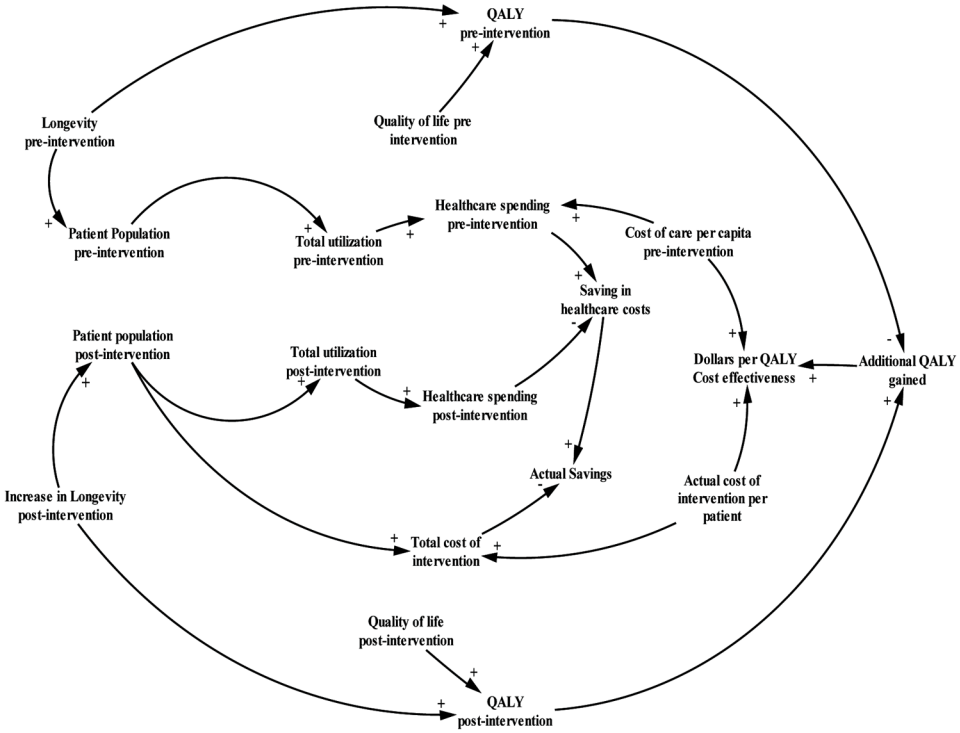
& Badía-Llach, 2006) and increase/decrease in longevity (Sassi, 2006) among others. Although there are additional aspects that influence these selected components, e.g., particular effects of a given intervention on specific subpopulations, the proposed model captures the aforementioned critical interactions confirmed by the dynamic behavior of the system which is presented in section 5.

The structure employed to evaluate the effectiveness of these interventions over time considers the well-known simulation mechanism denominated goal-seeking (Sterman, 2000). This mechanism is commonly used to determine the differences between a current and prospective behavior, in this case, pre- and post-intervention. A detailed description of the model follows.

Figure 1 presents the first causal loop diagram. The main function of this diagram is to establish the causal relationships among the concepts that are at the focus of our research interests: the cost of intervention per patient (i.e., denoted as *actual cost of intervention per patient*), the cost of healthcare per visit (i.e., denoted as *actual cost of care per patient*), and quality of life years (i.e., *Quality of Life Years pos-intervention*).

The causal loop diagram illustrates a simplification of the relevant dynamics at play within the system. As most population dynamics models, the flow of the population determines the behavior of the system. The population is assumed to be composed of patients that defined by having at least a single chronic condition that can be improved by a hypothetical intervention. The patient population flow utilizes the healthcare system prior and after the implementation of the intervention. This causal loop diagram shows the simultaneous measuring of the *QALYs* both prior to and after the adoption of the intervention. It also measures the *healthcare spending* simultaneously for both population flows and determines the prospective *cost saving* by calculating the difference between the two associated healthcare expenditures. The

Figure 1. Causal loop diagram



patient population prior the intervention is called *Population pre-intervention* while the one after the intervention is identified as *Population post-intervention*.

The *Longevity pre-intervention* impacts both the *Population pre-intervention* and the *QALY pre-intervention*. The *Population pre-intervention* impacts the *Total utilization pre-intervention* which determines the *Healthcare spending Pre-Intervention*. Similarly, the *Increase in Longevity post-intervention* impacts both the *Population post-intervention* and the *QALY post-intervention*. The *Population post-intervention* impacts the *Total utilization post-intervention* which influences the *Healthcare spending post-Intervention*. Both healthcare expenditures dictate the level of savings, denoted by *Savings in healthcare cost*, when implementing the intervention. However, the savings in costs do not paint the whole picture as implementing the intervention has a price, or *Total cost of intervention*, and this has to be subtracted from the savings in healthcare cost to obtain a more realistic *Actual Savings*. The *QALY pre-intervention* and the *QALY post-intervention* determine the *Additional QALY gained* which provides a monetary evaluation by determining the *Dollar per QALY Cost effectiveness*. This monetary assessment is complementary developed considering the *Actual cost of intervention per patient* and the *Cost of care per capita pre-intervention*. Relevant dynamics from the implementation of this framework where stock and rates are explicitly indicated are described as follows.

5.1. Population Dynamics

In order to estimate healthcare spending in the absence of intervention (i.e., '*healthcare spending pre-intervention*') we must have a sense of the size of the population, the rate at which the population utilizes health services for the treatment of chronic conditions, and the cost of that care per person. Thus, *total utilization pre intervention* is the total number of patient visits within the healthcare system retrospectively, meaning visits prior to -- and thus in the absence of -- the intervention. This population is modeled as a stock that is influenced by a birth and death rate while impacting the visit rates pre- and post-intervention that affects the system's utilization. This utilization stems from *pre-intervention per capita utilization* and *population pre-intervention* which, in turn, stems from *mortality pre-intervention*. When estimating *cost of care per capita pre-intervention*, a cost amplification factor (i.e., '*cost delay*') is applied with a time delay to compensate for the likely inflation in the cost of care for treating multiple chronic conditions as compared to fewer chronic conditions at the onset. In this fashion, *healthcare spending pre-intervention* is a function of *total utilization pre-intervention* and *cost of care per capita pre-intervention*.

In order to assess the impact over time of the intervention in terms of healthcare one must measure the difference between healthcare spending under the scenarios of intervention and the absence of intervention. *Savings in healthcare costs* captures this difference by *healthcare spending post-intervention* (i.e., scenario containing presence of the intervention) and *healthcare spending pre-intervention* (i.e., scenario containing the absence of intervention). This savings is modeled as a stock that is influenced by the average expenses due to the implementation of the intervention.

5.2. Intervention Dynamics

It is assumed that the intervention leads to improvements in health status. The logical linkage between the intervention and health status is represented by *actual population effectively targeted*, which is a product of the *fraction of the patient population targeted for intervention* and *effectiveness of intervention*. An increase in the effectively targeted population, in turn, corresponds with a reduction in mortality,

modeled and represented by *mortality post-intervention*. *Mortality post-intervention* is also conditioned by estimated *health status pre-* and *post-intervention*. This *mortality post-intervention* influences positively patient population. This further influences both *total cost of intervention* and *actual spending on healthcare post-intervention*. *Pre-* and *post- intervention per capita utilization* is assumed to estimate the *total number of patient visits* within the healthcare system, represented by '*total utilization post-intervention*.' *Post-intervention per capita utilization* has an aging amplification factor (i.e., '*aging delay'*) that captures the expectation that after a reduction in per capita utilization in the short-term, the per capita utilization will likely increase in the long-term as the patient population is further aged due to life extension resulting from the better management of the disease. Further, as patients age they are likely to develop multiple chronic conditions that result in further healthcare utilization.

5.3. Determining the Quality of Life Years

The Quality Adjusted Life Year takes into account the number of extended life years adjusted for the quality of those extended years. *Cost effectiveness* is the concept that these *QALY* can further be attuned by the dollar cost of the interventions that are responsible for the extended life. Thus, cost effectiveness is measured as the number of dollars expended per extended Quality Adjusted Life Year. Cost effectiveness is an important extension of the concept QALY. As noted above, the QALY may be used to evaluate the attractiveness of one intervention relative an opposing intervention. Yet policy decisions relating to adoption of an intervention seldom are made exclusive of the cost of the intervention. While an intervention may indeed extend the number of quality years, the cost of intervention may be fiscally or politically untenable. Qualitative questions about the value of life necessarily are at the forefront of policy debates. At what cost-point is an increase in QALY no longer politically sustainable? While the measure of cost effectiveness does not explicitly answer this question, it does provide a common metric by which we may make comparative statements among interventions in terms of dollars per Quality Adjusted Life Year.

The treatment intervention with a lowest per dollar QALY produces a relatively greater return and hence may be viewed as a more effective intervention. The measure of cost effectiveness is critical since decisions have to be made regarding the selection of new treatments that can be offered to the patients in an environment of budget constraints. In such a situation, the treatments that are most cost effective become candidates for selection as they promote an attractive utilization of scarce dollars. The *cost effectiveness of an intervention* is determined by taking the ratio of the difference in the cost of the two interventions and the difference between the *QALY* associated with each treatment (neglecting discount rate, though it is considered in many cost effectiveness studies). The resulting *dollar amount per QALY* is compared against standard guidelines to determine if the new treatment is sufficiently cost effective to replace the existing situation.

5.4. Other Dynamics

Parameters such as *effectiveness of the intervention*, *initial estimated cost of per patient pre-* and *post-intervention* and *effectiveness of intervention* are modeled as stochastic uniform functions that take into account the uncertainty associated with estimating these parameters. The trajectories of the *cost of intervention* and the *cost of healthcare* show the actual resources that can be spent to achieve some initial *savings*. The objective now is to simulate the model under different scenarios. The outcomes under

these scenarios allow for the development of useful theoretical insights into the expected functioning of this system.

6. SIMULATION AND RESULTS

6.1. Model Parameterization

This section provides the simulation results as they are generated under different conditions for a hypothetical scenario. The differences in simulated behavior under these scenarios assist in developing valuable insights about system behavior in response to the considered interventions. An illustrative hypothetical case assumes arbitrary values to test the capacity of this theoretical framework to generate metrics that reflects the system behavior under such circumstances. Note that the intent is to describe hypothetical system behaviors under loosely drawn assumptions. The following values have been arbitrarily assigned such that the differences between two situations, *Intervention* versus *No Intervention,* can be contrasted. The model assumes an *initial population* of 150,000 patients. The *cost of care* both *pre-* and *post-intervention* is assumed to be 100 monetary units per visit. The initial estimated *cost of intervention* is 10 monetary units. The *Longevity pre-intervention* is assumed to be 1 year per patient, and *Pre-intervention per capita utilization* is presumed to be 3.5 visits per patient per year. The *Quality of life pre-intervention* is assumed to be 0.3 within a theoretical 0-1 range where 0 represents the worst possible health quality and 1 represents best possible health quality. The *Quality of life post-intervention* is assumed to be 0.5 given a 0-1 theoretical range where 0 represents the worst possible quality of life and 1 represents the best possible quality of life.

The model is simulated under two specific scenarios for a period of 30 years. The logic is to see how the relevant system parameters behave under 'Intervention' versus 'no intervention.' 'No intervention' essentially typifies the original system. Vensim from Ventana Systems Inc. was employed to execute this simulation. Simulation results are described next.

6.2. Results

Table 2 indicates that the total visits by patients increases due to increasing population. However, the system behavior under the presence of the intervention illustrates that the total visits are relatively less during the first years. In the longer-term, though, consistent with the literature, the intervention yields system behavior that contains relatively more visits. This crossing of forecasted paths has been theorized to be attributable to the life extension of the population and, hence, an increase in utilization at advanced age due to multiple chronic conditions. It can be seen in Table 3 that interventions produce higher net savings in the short-term, yet the savings are eventually eroded as gains are overtaken by the population which has increased its longevity and, as a manifestation, has increased health-related utilization. This illustrates the view expressed earlier that the disease management intervention may not be cost saving, especially in the longer-term, since there is an explicit change in patient population over time where the population grows more rapidly relative non-intervention. This growth is due to the decrease in mortality as a result of better disease management.

Figure 2 exhibits the system behavior over time in terms of additional QALY gained, both when the condition of intervention is applied and when the condition of intervention is absent. At the base sce-

Table 2. Visits per year to ambulatory healthcare services

Time (Year)	No Intervention	Intervention
1	525,000	358,333
2	525,497	372,991
3	526,853	382,363
4	528,822	391,477
5	531,229	399,817
6	533,948	406,364
7	536,891	414,011
8	539,993	423,669
9	543,209	431,132
10	546,506	434,931
11	549,861	440,410
12	553,258	467,452
13	556,684	492,381
14	560,131	512,415
15	563,593	531,414
16	567,067	544,503
17	570,547	554,320
18	574,034	567,752
19	577,524	574,998
20	581,017	581,940
21	584,512	589,731
22	588,008	595,909
23	591,506	602,380
24	595,004	607,689
25	598,503	619,810
26	602,002	625,760
27	605,501	631,531
28	609,001	636,457
29	612,501	648,281
30	616,001	654,723

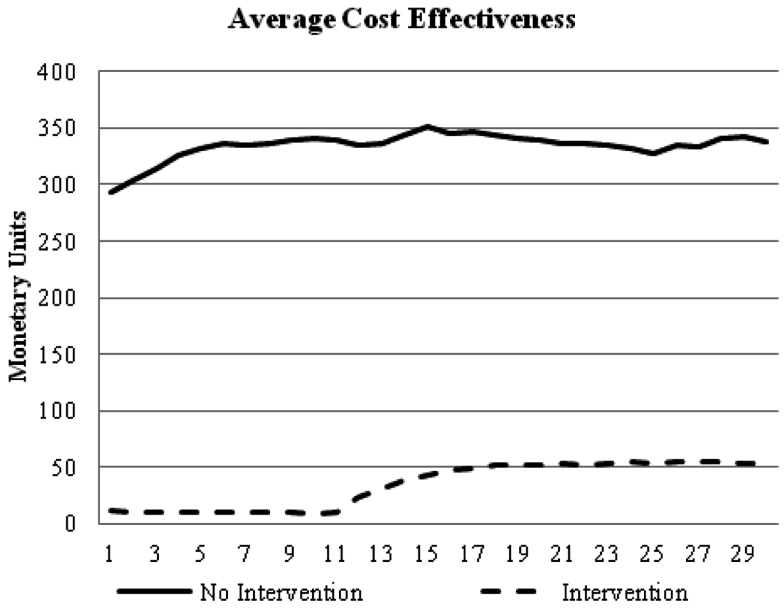
Table 3. Net savings per year for intervention versus no intervention scenarios

Years	No Intervention	Intervention
1	(14,912)	14,870,000
2	(122,098)	28,880,000
3	(395,154)	42,050,000
4	(886,653)	54,150,000
5	(1,634,000)	66,050,000
6	(2,664,000)	77,150,000
7	(3,996,000)	87,530,000
8	(5,643,000)	97,240,000
9	(7,616,000)	106,320,000
10	(9,922,000)	114,750,000
11	(12,560,000)	109,300,000
12	(15,540,000)	101,070,000
13	(18,870,000)	88,450,000
14	(22,540,000)	73,590,000
15	(26,560,000)	57,220,000
16	(30,920,000)	40,010,000
17	(35,640,000)	20,930,000
18	(40,700,000)	181,900
19	(46,110,000)	(21,310,000)
20	(51,870,000)	(43,090,000)
21	(57,980,000)	(66,020,000)
22	(64,440,000)	(90,060,000)
23	(71,250,000)	(114,620,000)
24	(78,400,000)	(141,050,000)
25	(85,910,000)	(167,810,000)
26	(93,770,000)	(196,030,000)
27	(101,970,000)	(224,610,000)
28	(110,530,000)	(253,910,000)
29	(119,430,000)	(284,300,000)
30	(128,690,000)	(315,060,000)

nario where no intervention is implemented, the QALY remains lower; the dotted line, representing the intervention scenario, shows substantial improvements in QALY. Note that there is neither improvement nor worsening in gained QALY under the non-intervention scenario and there are positive additional QALY obtained under the intervention scenario.

Figure 3 exhibits the relationship between Dollars and Dollars expressed as the cost effectiveness. The solid line indicates the non-intervention scenario while the dotted line indicates intervention scenario.

Figure 2. Additional QALY gained



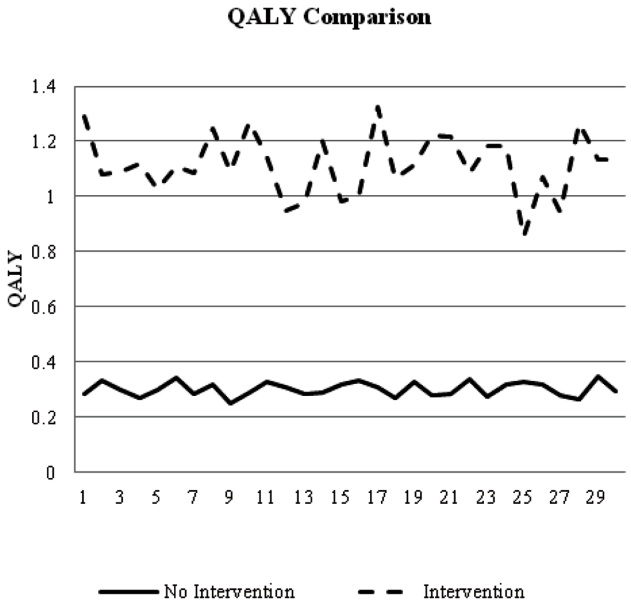
Accordingly, the intervention scenario demonstrates the superiority of applying the interventions in terms of its effectiveness. Certainly, the closer this value is to 0, the better the intervention. In our hypothetical scenario, the values obtained show that, relative to the non-intervention scenario, the intervention scenario is highly effective.

7. CONCLUSION

Chronic disease is widespread in the United States. Chronic diseases constitute a major portion of the healthcare expenditure. These expenditures are projected to increase as the population ages. Chronic disease management is broadly inclusive of patient-driven activities as well as partnerships between the patients and the healthcare organization. Management efforts are argued to result in better health outcomes and savings to the health care system, especially through lower utilization. Although the cost effectiveness of such interventions is widely acknowledged, the long-term cost saving potential -- or at least the cost neutrality -- of such interventions is more uncertain. Cost evaluations of disease management interventions are complicated by a number of uncertainties in estimating the actual cost of delivering the intervention and impact of intervention on the actual utilization. Factors such as the type and the frequency of the intervention, type of chronic condition, and other patient characteristics, may determine the actual impact of the intervention on cost and utilization.

The literature suggests that certain disease management interventions can be cost saving in the short-term. However, the cost saving potential of such interventions on a long-term cost basis seems unfavorable. Longer-term cost saving analyses based on Markov models suggest that although disease management interventions are likely to be cost effective, they are unlikely to be cost saving in the long-term. This is likely because disease management interventions lead to reductions in mortality that, in

Figure 3. Dollars/QALY - cost effectiveness



turn, lead to future disease related costs and possibly unrelated costs of other chronic conditions that the patient may acquire as a result of aging.

While cost effectiveness is a welcome characteristic of such interventions, the excessive pressure of escalating healthcare costs on individuals and organizations makes cost saving imperative. In such a situation, the deliberating parties have to achieve a balance between harnessing the effectiveness of such interventions to produce better health outcomes while at the same time recognizing that such efforts impact longer-term cost saving.

This framework presents a basic representation of the dynamics of the system and an analysis of system behavior under several hypothetical scenarios. Such scenario analyses are a starting point and add value to the deliberative decision making processes. These scenario analyses indicate that the application of interventions is likely to produce reduced utilization and savings in the short-term, but these savings will be overtaken in the longer-term. This has been attributed to reduced mortality, increased longevity, a continued utilization of health system resources. In a practical sense, this demonstrates a positive, reinforcing feedback structure which is instigated by an intervention and makes it difficult to achieve cost saving in longer-term. The results obtained from this scenario analysis provide useful insights and corroborate assertions made in the literature and, as such, serves as validation for the model behavior.

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